[Part 12. Reprinted 1959]

IMPERIAL MYCOLOGICAL INSTITUTE

REVIEW

OF

APPLIED MYCOLOGY

VOL. XI. DECEMBER 1932

MAGEE (C. J.) & MORGAN (W. L.). **Diseases and pests of glasshouse Tomatoes.**—*Agric. Gaz. New South Wales*, xliii, 6, pp. 427–437, 7 figs., 1932.

This is a series of brief popular accounts of the more important parasitic diseases and pests that attack tomatoes under glass in New South Wales. The fungal and allied diseases dealt with include *Fusarium* wilt (*F. lycopersici*), *Verticillium albo-atrum* wilt, late blight (*Phytophthora infestans*), early blight (*Macrosporium* [*Alternaria*] *solani*), bronze or spotted wilt [*R.A.M.*, xi, p. 78], leaf spot (*Septoria lycopersici*), and mosaic. Recommendations for the control of these troubles are given in each case.

BÖNING (K.). **Die Bekämpfung der Brennfleckenkrankheit des Tabaks (Colletotrichum tabacum) durch Beizung des Samens und vorbeugende Behandlung der Pflanzen mit chemischen Mitteln.** [The control of Tobacco anthracnose (*Colletotrichum tabacum*) by seed disinfection and protective treatment of the plants with chemical substances.]—*Prakt. Blätter für Pflanzenbau und Pflanzenschutz*, x, 3–4–5, pp. 89–106, 4 figs., 1932.

The seed is stated to be the primary source of infection of tobacco seedlings by the anthracnose or 'stem and rib scorch' disease due to a species of *Colletotrichum* in Bavaria [*R.A.M.*, ix, p. 746], although the incidence of primary infection in the seedlings is low (only 2 per cent. when unselected seed from diseased capsules and 1 per cent. when selected seed is sown). The spread of infection, notwithstanding this small proportion of diseased seedlings, is facilitated by dense sowing and generally proceeds with great rapidity. Experiments were therefore carried out in seed disinfection and spraying and dusting in the seed beds and in the field.

The results [which are tabulated and discussed] indicated that the seed may be largely freed from the adherent spores by appropriate treatment, though the internal mycelium may survive and cause a certain amount of infection in the subsequent stand. The best control in the seed-beds was given by 30 minutes' immersion in silver nitrate [cf. ibid., x, p. 134] or uspulun-universal, both at a strength of 0·25 per cent., which reduced the

incidence of anthracnose from 55 to 0 per cent. The seed stood immersion in uspulun-universal at strengths below 0·5 per cent. without injury, but at or above this strength injury to germination became apparent. Formalin caused no injury at 0·1 per cent. for 15 mins., but the control of the disease was somewhat less effective. When the seed was sprouted after treatment but before sowing, injury was caused at lower concentrations of the disinfectants [cf. ibid., v, p. 138].

Complete control by seed disinfection is probably not possible, as in some cases the mycelium appears to be within the tissues of the seed. Experiments in spraying the seed-beds were, therefore, undertaken and showed that Bordeaux mixture at 0·5 and 1 per cent. considerably reduced the amount of disease, dusting with cusisa [ibid., x, p. 706] and cupulvit [ibid., x, p. 582] also giving good results. Further experiments carried out on the crop after transplanting to the field confirmed the beneficial effects of spraying with 1 per cent. Bordeaux mixture or dusting with cusisa.

CALDWELL (J.). **Studies in the physiology of virus diseases in plants. III. Aucuba or yellow mosaic of Tomato in Nicotiana glutinosa and other hosts.**—*Ann. of Appl. Biol.*, xix, 2, pp. 144–152, 1 pl., 1932.

The experiments described in some detail in this paper showed that when tomato aucuba mosaic virus [*R.A.M.*, xi, p. 679] was rubbed on the leaves of *Nicotiana acuminata*, *N. glutinosa*, and *Datura stramonium*, necrotic spots developed on the treated leaves, but no systemic infection of the plants as in *N. tabacum* [ibid., xi, p. 333] resulted. The spots were about 5 mm. in diameter, roughly circular, and increased only slightly for a few days. No intracellular inclusions were found in the cells of the inoculated leaves. It was shown that in *N. glutinosa* the virus is unable to move across the lamina of the leaves or to enter unbroken cells, the latter fact having been demonstrated by experiments in which the intercellular spaces of the leaves were injected with virus juice without exhibiting any symptom of infection. This was further confirmed by the fact that it was found possible to grow tomato seedlings on cotton wool soaked in virus juice, the resulting plants growing fairly rapidly and remaining free from infection. The work amply supported Holmes's suggestion of using *N. glutinosa* as a ready means of demonstrating the presence of the virus agent in a juice [ibid., viii, p. 532].

Experiments with tomato and *D. stramonium* grafts in various combinations indicated that the aucuba mosaic virus travels through the *D. stramonium* tissues without causing any mosaic symptoms on this host, but that after this passage it can infect the tomato whether the latter is scion or stock.

KRAYBILL (H. R.), BREWER (P. H.), SAMSON (R. W.), & GARDNER (M. W.). **A noninfectious leaf-deforming principle from mosaic Tomato plants.**—*Phytopath.*, xxii, 7, pp. 629–636, 2 figs., 1932.

Filiform leaf deformities ('fern-leaf') closely resembling certain

mosaic symptoms were produced on the new growth of tomato seedlings by massive inoculation with filtrates obtained from mosaic plants and rendered non-infectious by heating to 126° C. for 2½ hours [*R.A.M.*, ix, p. 417 ; x, p. 346]. In no case was an active filtrate obtained from healthy tomato plants. The leaf deformities were also readily induced by means of filtrates from infected plants stored *in vitro* for from three to ten months, while in one case the fermented juice stored for four years caused fern-leaf in 12 out of 20 inoculated plants.

When plants showing marked leaf deformities from inoculation with the leaf-deforming principle were crushed and used as inoculum for healthy plants, no deformities were produced in the latter. The leaf-deforming principle, therefore, is evidently not transmissible from plant to plant like a virus, nor does it increase in the plant in the absence of mosaic virus. Further evidence that the leaf-deforming principle and the mosaic virus are not identical was afforded by the fact that the inoculation of tomato plants with the former combined with the 'healthy potato' virus did not produce streak, which would have developed in the presence of the tomato mosaic virus [cf. ibid., x, p. 537; xi, pp. 271, 679]. Similarly, inoculation with the juice of plants showing only the leaf deformities and with the potato virus failed to produce streak. In general, the most active filtrates were prepared by permitting the juice from mosaic plants to autolyse or ferment, suggesting that the leaf-deforming principle may be formed through decomposition of the plant juice constituents, though apparently it is a product of diseased tissues only. It is considered to be non-living and not of the nature of a virus.

GRAVATT (G. F.) & CLAPPER (R. B.). **Verticillium wilt of Maple, Ailanthus, and Elm.**—*Plant Disease Reporter*, xvi, 9, pp. 96–98, 1932. [Mimeographed.]

In Virginia, Washington, D.C., Rhode Island, and New Jersey, Norway and sugar maples [*Acer platanoides* and *A. saccharum*] have recently been found suffering severely from the wilt due to *Verticillium* [*albo-atrum*: *R.A.M.*, xi, p. 213], characterized by typical green or dark streaks in the white sapwood. In the spring of 1932 the same disease was observed on an *Ailanthus* [*glandulosa*] tree in the vicinity of the infected maples, while a report from New York City states that the fungus is spreading on *Ailanthus* attacked last autumn [ibid., xi, p. 550]. This host was also found infected at Philadelphia in 1931. In Ohio the wilt appears to be declining in prevalence on elms.

FISCHER (R.). **Das Ulmensterben.** [The die-back of Elms.]—*Die Natur*, Vienna, *1931*, p. 61, 2 figs., 1931. [Abs. in *Zeitschr. für Pflanzenkrankh. u. Pflanzenschutz*, xlii, 7–8, p. 397, 1932.]

Since the first authentic record of elm die-back [*Ceratostomella ulmi*] in Austria in 1926 [*R.A.M.*, vii, p. 684; xi, p. 409], numerous fine trees in the avenues of Vienna have succumbed to the disease, which in some cases has assumed an acute, in contrast to the usual chronic form.

ZAPROMETOFF (N. G.). Бактериоз и карликовость—новые болезни Шелковицы в Средней Азии. [Bacteriosis and dwarfiness—new diseases of the Mulberry in Central Asia.]—*Шелководство* [*Sericulture*], Moscow, *1932*, 5, pp. 36–38, 1932.

The author states that young mulberry [*Morus* spp.] trees grown from cuttings imported from Japan and planted in 1930 in an experimental nursery near Tashkent were found in 1931 to be infected with *Bacterium mori* [*R.A.M.*, x, p. 347], of which he considers *Bact. cubonianum* to be a synonym [cf. ibid., viii, p. 142]. While the disease has, so far, done little damage to the trees, the fact that it is apparently a new introduction and that it was also observed on trees of a local species growing close to the infected Japanese plants and on which the organism had not been seen hitherto, calls for serious attention, owing to its unknown potentialities in a new area of dispersion. Some recommendations for its control are given.

The Japanese cuttings also showed incipient symptoms of a disease, termed dwarf disease, which is stated to be economically important and very widespread in Japan [ibid., iv, p. 364], where it is considered to be a functional trouble, although its true nature has not yet been definitely established. In its initial stage the disease is characterized by a slight wrinkling of the leaf blades, whose surface becomes granular and firmer to the touch than normal, but without any colour change. In the second stage the leaves become smaller and more deeply indented, acquire a hard texture and assume a yellowish-green tinge. They develop on considerably shortened internodes, and the new shoots are weak and slender. In the third and final stage, the symptoms are enhanced and the trees assume a witches' broom-like aspect. The root system of the affected trees also develops less vigorously than normal.

OGILVIE (L.). **Notes on the rusts of basket Willows and their control.**—*Ann. Rept. Agric. & Hort. Res. Stat., Long Ashton, Bristol, for 1931*, pp. 133–138, 1 pl., [1932].

Salix triandra and *S. viminalis* grown commercially for basket-making in Somerset are each attacked by a rust. On the former host, on which all stages of *Melampsora amygdalinae* [*R.A.M.*, x, p. 584] are found, the most important stage in the life-history of the fungus, from the growers' point of view, is the infection of the green stem. This first takes place early in July, usually near an infected leaf stalk. These infections are not extensive but as the stem enlarges and hardens, elongated, depressed cankers form, which, like the uredo pustules on the leaves, produce orange uredospores throughout the summer. The uredo stem cankers remain dormant during the winter, producing a fresh crop of uredospores in early spring. On rods in pits uredospores may appear in March. Initiation of the yearly cycle may be brought about by sporidia shot off from the old leaves on the ground giving rise to aecidia, the aecidiospores from which again give rise to uredo pustules, or by uredospores liberated from overwintered cankers on old rods.

The teleutospores of the rust fungus, *M. larici-epitea*, which

occurs on *S. viminalis*, germinate in early spring, giving rise to sporidia which were found experimentally to infect the leaves of larch (*Larix europaea*). About a fortnight after infection, minute, pale orange aecidial pustules are produced on the larch leaves; apparently they are formed out of doors in May and June. The resulting aecidiospores in turn infect young leaves of *S. viminalis*, on which uredo- and teleutospores are produced. The rust does not form cankers on the stems, and the only method of overwintering appears to be by means of teleutospores on dead leaves. This rust is not of great economic importance.

LEVEN (G.). **A die-back disease on Pines (Brunchorstia destruens Erikss.).**—*Quart. Journ. of Forestry*, xxvi, 3, pp. 225–231, 3 pl., 1932.

After listing the different species and varieties of *Pinus* upon which *Brunchorstia destruens* [*R.A.M.*, xi, p. 136] has been reported in different parts of the world, the author, writing from a practical point of view, states that the disease is certainly on the increase and already of more than academic interest; he has observed it in many parts of Scotland as well as in Lincolnshire. A visit to Denmark in 1932 showed that it was extremely widespread there [ibid., viii, p. 686], French mountain pine (*P. montana* var. *gallica*) in Western Jutland being badly attacked on heath areas. In the last ten or twelve years the disease has been observed in Britain on Austrian (*P. laricio* var. *austriaca*), Corsican (*P. laricio*), and mountain pines (*P. montana* var. *uncinata*) [ibid., vi, p. 196], while the appearance of certain Scotch pines (*P. sylvestris*) has long been disquieting [cf. ibid., ix, pp. 215, 569]. *P. montana* var. *uncinata* has probably been the most susceptible tree in Britain, the Austrian pine has been only a little less so, while the Corsican pine withstood the disease better than either. From personal observation the author has gained the impression that the organism is parasitic on *P. sylvestris*, but very weakly so where the host is growing under normal conditions.

SZILVINYI (A.). **Trichoderma nunbergii n. sp.**—*Zentralbl. für Bakt.*, Ab. 2, lxxxvi, 5–7, pp. 135–139, 2 figs., 1932.

A species of *Trichoderma*, differing in its morphological and physiological characters [which are described] from any hitherto reported, was isolated from the feeding galleries of *Pictyogenes curvidens* in the conifer forests of the mountains of Silesia. The viscosity of the conidia facilitates their adhesion to the beetles which disseminate them in the galleries, but no symbiotic relation between fungus and insects could be demonstrated.

FINDLAY (W. P. K.). **Laboratory methods for testing wood preservatives.**—*Ann. of Appl. Biol.*, xix, 2, pp. 271–280, 1 graph, 1932.

The author briefly reviews and discusses the various methods used in Europe and America for the testing in the laboratory of wood preservatives, and points out their respective advantages and defects. In outlining the desiderata which are to be borne in mind in these trials, he states that the experiments should be carried out with pure cultures of the timber-rotting organisms, each preservative

being tested against a number of species of the latter. The culture medium should be the material which it is desired to protect against fungal attack; this material should be as nearly as possible in its normal physical condition, and the conditions for the growth of the organisms tested must be optimum.

SCHMITZ (H.) & BUCKMAN (S.). **Toxic action of coal-tar creosote with special reference to the existence of a barren nontoxic oil.**—*Indus. & Engin. Chem.*, xxiv, 7, pp. 772–777, 1 fig., 4 graphs, 1932.

Malt agar cultures of *Fomes annosus* and *Trametes serialis* were exposed to the action of eleven components of a coal-tar creosote sample separated by distillation [cf. *R.A.M.*, viii, p. 621; ix, p. 619; x, p. 217].

The original preparation was moderately toxic, killing *F. annosus* at a strength of 0·9 to 1 and *T. serialis* at 1 to 2 per cent., while the growth of both fungi was inhibited for two weeks at 0·1 to 0·2 per cent. The fraction of the coal-tar creosote distilling below 285° C. was much more toxic than the original, destroying *F. annosus* at 0·04 to 0·06 and *T. serialis* at 0·06 to 0·08 per cent. The fraction distilling between 285° and 350° showed a considerable drop in toxicity, concentrations of over 20 per cent. being necessary to destroy either fungus. The residue distilling above 350° failed to inhibit completely the growth of the test organisms even at concentrations above 20 per cent., but it exerted a marked retarding action on their development even at 1 per cent. A crystalline material formed on cooling the fraction distilling below 285° proved remarkably toxic, killing both fungi at 0·02 to 0·04 per cent.; this substance appears to be a form of naphthalene containing impurities to which its toxicity may probably be attributed. *F. annosus* was also destroyed by 0·02 to 0·04 per cent. solution of the fraction distilling below 285°, subjected to ten alternate washes with acid and alkali, redistilling, treatment with methanol solution of mercuric chloride, treatment with metallic sodium, redistilling, and washing with water, and *T. serialis* at 0·01 to 0·02 per cent. A bright yellow precipitate which formed on cooling the 285° to 350° fraction proved moderately toxic, a 5 per cent. concentration inhibiting the growth rate of *F. annosus* by about 72 per cent. and that of *T. serialis* by 68 per cent. When the 285° to 350° fraction was subjected to the various treatments described above for the fraction below 285°, it yielded a substance resembling Bateman's 'barren oil' [cf. ibid., iii, p. 617; v, p. 398], which at a strength of 1 per cent. inhibited the growth of *F. annosus* by 95·6 per cent. and at 20 per cent. by 96·5 per cent., the corresponding figures for *T. serialis* being 93·5 and 98 per cent.

The results of these experiments are discussed in the light of some of the recent researches on wood preservation and allied subjects.

OGILVIE (L.) & MULLIGAN (B. A.). **Progress report on vegetable diseases. III.**—*Ann. Rept. Agric. & Hort. Res. Stat., Long Ashton, Bristol, for 1931*, pp. 119–132, 2 pl., [1932].

Surveys made in the Evesham area in 1931 emphasized the

serious and widespread nature of halo blight (*Bacterium medicaginis* var. *phaseolicola*) of dwarf beans (*Phaseolus vulgaris*) recently recorded for the first time in England [*R.A.M.*, x, p. 434; xi, p. 143]. Canadian Wonder, Early Prolific, and Masterpiece were highly susceptible. Evidence was obtained that ground which has borne diseased plants does not necessarily bear infected beans in the following season, most field infections arising from infected seed. The chief hope of control [cf. ibid., x, p. 423] appears to be in the use of resistant varieties. In field trials the following showed resistance: Black Wonder (partially), Ne Plus Ultra (partially), Incomparable, Magpie, and Superlative.

In further varietal tests of the resistance of dwarf bean varieties to dry root rot (*Fusarium martii* var. *phaseoli*) [ibid., xi, p. 143], Early Saxony and Early Pacific were susceptible, but Sharpe's Goliath and Magnum Bonum were resistant, probably owing to their thick stems and extensive roots. Flageolet St. Andrew and Incomparable also gave fair results.

Leeks were affected, sometimes rather seriously, by a *Botrytis* which produced grey, elongated, depressed spots later enlarging into well-defined grey or whitish areas with water soaked edges, near the tip or base of the leaves. Mouse-coloured conidiophores and conidia were present on both surfaces.

Spring onions were attacked by a small-sclerotial, highly pathogenic *Botrytis* which produced small, circular or elliptical, white spots often surrounded by a water soaked margin; the area surrounding the spots sometimes dried out, turning yellowish-green or grey, so that the tips of the leaves died.

Ascochyta pisi and *Mycosphaerella pinodes* [ibid., vii, p. 611; x, p. 408] were prevalent on peas in the vicinity of Bristol, the former causing a severe spotting of the pods and the latter, in addition, a severe foot rot.

About 1 per cent. of peas grown from commercial samples at Long Ashton were affected by a mosaic, the leaves and stipules being strikingly mottled with pale green or yellowish-green depressed or raised, usually interveinal areas. The pods were distorted and showed irregular, linear, depressed, dark green areas. The stems were also mottled. Preliminary experiments indicated that the disease is transmissible by rubbing.

HENDRICK (J.). **The prevention of finger-and-toe in Turnips. Liming and a disease-resistant variety.**—*Trans. Highland & Agric. Soc. of Scotland*, Ser. 5, xliv, pp. 52–63, 1932.

The results [which are fully discussed and tabulated] of five years' experiments at Craibstone, Aberdeen, indicate that the yellow Bruce turnip variety is able to withstand infection by finger-and-toe [*Plasmodiophora brassicae*] even on land saturated with the fungus on which reputedly resistant varieties, such as Victor Achilles, are practically wiped out [*R.A.M.*, x, p. 637]. It yielded almost a full crop on plots that have borne turnips every season for the last 15 years, and on the unlimed parts of which all other turnip and swede varieties tested of recent years have been virtually destroyed by the disease.

STILBACH (K.). **Beobachtungen an Erbsenrost.** [Observations on Pea rust.]—*Deutsche Landw. Presse*, lix, 24, p. 302, 1932.

Considerable damage is stated to be caused in Germany by pea rust (*Uromyces pisi*), the aecidial stage of which is formed on *Euphorbia* spp., especially *E. cyparissias* [*R.A.M.*, vii, p. 540; ix, p. 602]. In greenhouse and field experiments in 1929 and 1930, pieces of the latter plant, heavily infected by the rust, were enclosed in paper bags and tied over the pea shoots for 14 days. At the end of this period the first uredo pustules were observed, and a rapid spread followed, neighbouring plants becoming infected.

A large number of garden and field pea varieties tested in 1930 all proved susceptible to rust, as did also a series of species of *Lathyrus* with the exception of *L. sativus*, which remained completely immune. On some species of *Lathyrus* teleutospores were produced directly following the infection.

GROOSHEVOY (S. E.). **Root rot disease of the seedlings of Sugar Beet.**—*Proc. Exper. Select. Stat. Mironovka*, Kieff, pp. 1–49, 1931. [Russian, with English summary. Abs. in *Neuheiten auf dem Geb. des Pflanzensch., 1932*, 1–2, p. 13, 1932.]

Sugar beet seedlings are stated to be most severely damaged by *Phoma betae* [in the Ukraine] at a temperature of 19° C. [*R.A.M.*, x, p. 425]. When attacked before the formation of the third leaf pair the plants may sustain a loss of 50 per cent. or more by weight. Root rot is most injurious to seedlings from seed-clusters harvested before maturity or to poorly developed ones; the incidence of infection is reduced by the application of stable manure to the seed-bearing crop. The disease is most prevalent where crop rotation is neglected; the best forerunners for beets are stated to be peas. The heaviest damage recently occurred in very alkaline and neutral clay soils, whereas the epidemic of 1926 took place under acid soil conditions.

DRAKE (C. J.), TATE (H. D.), & HARRIS (H. M.). **Preliminary experiments with aphids as vectors of yellow dwarf.**—*Iowa State Coll. Journ. of Sci.*, vi, 3, pp. 347–354, 1 pl., 2 figs., 2 graphs., 1932.

This is the full account of the work described in a preliminary paper which has already been noticed [*R.A.M.*, xi, p. 556]. Of the additional information given it may be mentioned that under certain conditions the symptoms of yellow dwarf of onions may be completely masked until the onions have undergone a rest period and then been regrown. Both young and old masked plants were proved capable of infecting aphids which subsequently convey the disease to healthy onions. The aphids are not able to breed or to live for more than three to six days on the onion alone which is only a transient host, serving to help sustain the wandering lice during migration. A single aphid was proved to be capable of inoculating a plant, but the percentage of transmission under such conditions was much less than when a higher number was used. Aphids caged for 30 minutes on diseased plants and then transferred individually to healthy ones for a like period successfully

inoculated them, thus demonstrating how migratory lice may inoculate plants by single feedings. On the third or fourth day after inoculation the onion becomes a source of infection for aphids and remains so, but the aphids soon lose the virus unless constantly reinfected from diseased plants. The degree of injury depends upon the stage when the plant is inoculated, but sets infected soon after the new foliage appears frequently fail to make any appreciable growth.

STEVENS (N. E.). **United States of America: an unusual outbreak of Celery early-blight.**—*Internat. Bull. of Plant Protect.*, vi, 6, pp. 94–95, 1932.

Early blight of celery (*Cercospora apii*) is reported by P. L. Wellman to have been so destructive in Florida during the winter season of 1931–2 that the usual control measures were ineffectual [*R.A.M.*, x, p. 220]. The virulence of the fungus is believed to have been correlated with the unusually high temperatures and relative humidity prevailing during this period. The weather conditions recognized by growers as favouring early blight are rainless spells accompanied by light easterly winds, warm, bright days, and nights sufficiently cool to produce a heavy dew. In many cases the crop was ploughed up as worthless for harvesting, while even the marketable plants were of inferior quality owing to the damaged leaves and petioles, the condition of which was aggravated by the attacks of saprophytes, such as *Alternaria* and *Botrytis*.

PASCALET (M.). **La mosaïque ou lèpre du Manioc.** [Mosaic or leprosy of Cassava.]—*Agron. Colon.*, xxi, 172, pp. 117–131, 4 pl., 10 figs., 1932.

In the Javanese form of cassava mosaic [*R.A.M.*, xi, pp. 152, 621] the young plants show a perfectly characteristic regression in the tissues of the leaf, which may progress so far as to lead to partial or complete abortion of the organ (as in human leprosy) but there is little alteration in the normal green colour. In the African form chlorosis is a more marked symptom but is unlike that of the more usual mosaic diseases in that the discoloured areas are intensely bleached and are sharply bounded by the veins. Infected cuttings or seed may produce plants that appear to be almost normal until after the development of the eighth or tenth leaf when regressive changes appear; with intensive manuring these plants tend to resume a normal appearance. In more serious attacks the regression produces a shortening of the internodes and obvious dwarfing, the terminal shoot showing a rosette type of development.

The internal modifications are at first histological and subsequently cytological. In those parts which are merely discoloured the palisade tissue is reduced and the cells composing it are much shortened. When there is also hyperplasia the reduction of the palisade parenchyma is accompanied by an increase of the mesophyll, in which the fibro-vascular bundles are disarranged, the reduced area of the leaf surface being unaccompanied by any equivalent reduction in the vascular system; in the regressed

leaves the small bundles are separated from each other only by a few mesophyll cells. This causes an extreme abnormality in the structure of the blade, which is thickened by this accumulation of vascular elements under a reduced surface area.

The modifications which take place in the cellular contents are as follows. The areas which are turning white contain fewer but much larger plastids than the normal tissues, and these plastids contain smaller starch grains and more diffuse contents than the normal. The chlorosis results first from a loss of pigment, then a reduction in the number of plastids, finally there is an undue preponderance of normally uncoloured tissues such as the fibro-vascular elements.

Cassava mosaic, first reported by Dammer from east Africa in 1895, is present in an intense form in the central region of the French Congo and in Gabun. It is probably endemic in Dahomey, the Ivory Coast, and Togo. It has been reported from Sierra Leone [ibid., vii, p. 304], occurs, probably sporadically, in the Belgian Congo [ibid., x, p. 166], is present over the whole area of cassava cultivation in the Cameroons [ibid., ix, p. 11; x, p. 639], in an endemic form in the south and south-east of this region, epidemically about Yaounde, and sporadically further north. Gabun suffers worst; in the north of this locality the crop was most seriously reduced in 1920–1921. At this date the disease apparently spread towards the Cameroons and into the French Congo. In one locality where cuttings of resistant American varieties have been introduced the disease has diminished, the prophylactic methods recommended by the local French agricultural station also having had a marked effect, especially in eliminating types of cassava weakened through inherited mosaic.

The author definitely inclines to the view that insect vectors play the chief role in transmitting the disease. The disease was experimentally transmitted by grafting but not by juice inoculations. It was ascertained that it may be present in a latent form, as plants apparently healthy may give diseased progeny. Soil which has borne a diseased crop remains contagious to healthy plants for at least two years.

The only practicable method of control consists in the careful selection of resistant varieties, attention also being paid to sources of contagion.

A bibliography of 14 titles is appended.

DADE (H. A.). **Cassava mosaic.**—*Gold Coast Dept. of Agric. Year-Book 1930* (*Bull.* 23), pp. 245–247, 1931.

Farmers in the Gold Coast state that mosaic of cassava (*Manihot apii*) [see preceding abstract] was first seen locally in a mild form in 1926 at Aburi. Until 1929 occasional searches for the disease in various parts of the country met with no result, but in that year and the next it began to appear quite commonly in some districts, and in a form sufficiently severe to be of marked economic importance. In a short time the disease will have spread throughout the Gold Coast, where, cassava being one of the staple native food crops, the outlook is serious. Experiment showed that two varieties, Calabar II and Bankye sareso, are resistant. Both are

less suitable than the more commonly cultivated and susceptible varieties, but provide material from which by selection and crossing, an immune and hardy short-period form (i.e., one with tubers which become ready for lifting after about thirteen months) with good food qualities may be derived.

WRIGHT (J.). **Root rot of Coco-yams.**—*Gold Coast Dept. of Agric. Year-Book 1930* (*Bull.* 23), pp. 184–197, 3 pl., 1931.

Root rot of coco-yams [*Xanthosoma sagittifolium* and *Colocasia antiquorum*] is now a very serious disease in the Gold Coast, where it was first reported in 1925. The disease may appear any time after planting, and may destroy the shoots from the sprouting seed pieces before they appear above ground, or cause them to remain extremely stunted, with abnormally small leaves, in which case they may die off after becoming well established. The visible symptoms in grown plants are flaccidity and yellowing of the leaves, which develop chlorotic patches and are often attacked by *Cladosporium colocasiae*, *Phyllosticta colocasiae*, and insects, the whole plant eventually wilting. The roots of the diseased plants show blackening, necrosis, and wet rot, which usually starts from the tips but may begin from lesions anywhere along their length. Roots so affected rapidly become completely discoloured and die and the decay reaches the corms, rotted hollows forming where the roots arise and leading to complete putrefaction. The decaying corms are usually coated with the mycelium of *Sclerotium rolfsii*.

Isolations from discoloured but turgid tissues yielded species of *Fusarium*, a *Rhizoctonia*, species of *Actinomyces*, yeasts, and bacteria. None of these organisms was invariably present, but a Phycomycete, presumed, from the general similarity of the disease to that found on the same host elsewhere, to be *Pythium aphanidermatum*, was present in the diseased tissues in most cases examined, though attempts to isolate it failed.

Artificial infection experiments indicated that the condition of the soil is the determining factor in conducing to the disease. Infection is not carried by the seed. It is presumed that the disease is caused by *P. aphanidermatum*, and occurs only when the plants are subjected to some physiological disturbance.

Moisture and soil reaction did not affect the incidence of infection. It is thought probable that potash deficiency is a primary factor. The local farmers maintain that the condition does not occur on virgin soil. Coco-yams may grow normally for two or three years on a farm cleared from secondary bush, after which it becomes impossible to cultivate them. It was observed that coco-yams grown in soil from which the secondary bush has been burned off and to which potash has thus been supplied develop much better than those in areas where only clearing has been effected. The former soil was found to have a potash content (expressed as percentage of fine earth) of 0·09 at four inches and 0·08 at one foot, whereas the latter had only 0·03 per cent. In the course of one field drainage experiment in infected soil only three plants grew to a reasonable size; they were on the edge of a plot near which a large heap of bush cuttings had been fired when the plants were

about two months old, and though attacked early had made a good partial recovery. Part of the same experimental area had previously grown cassava and the disease was much more severe in the early stages on this part than elsewhere. It is presumed that the cassava had removed large quantities of available potash from the soil.

All varieties of coco-yams tested were susceptible. [Elsewhere in the Year Book it is stated that the varieties grown include four of *X. sagittifolium* and one of *C. antiquorum*.] Control by rotation, applications of wood ash, and improved general sanitation is suggested, and there is a bibliography of 20 titles.

LAMBERT (E. B.). **'Bruise spot' disease of cultivated Mushrooms widespread in 1931–1932.**—*Plant Disease Reporter*, xvi, 3, p. 25, 1932. [Mimeographed.]

Severe damage from a hitherto undescribed disease of edible mushrooms to which the name 'bruise spot' is applied, was reported from New York, Pennsylvania, Ohio, and Illinois during the winter of 1931–2. The spots are bluish-grey on the surface, dry, and usually sunk in the tissues of the cap, arresting the growth of the latter. They are quite distinct from the superficial slimy, dark brown blemishes due to *Bacterium* [*Pseudomonas*] *tolaasii* [*R.A.M.*, xi, p. 493]. A *Verticillium* has constantly been found associated with these spots and produces the typical symptoms on inoculation into healthy caps. It is probably related to *Mycogone perniciosa*, but fails to form the chlamydospores characteristic of this genus on potato dextrose agar or mushroom tissue.

RAVAZ (L.). **Chronique. Toujours le mildiou.** [Current events. Mildew still.]—*Prog. Agric. et Vitic.*, xcvii, 26, pp. 617–620, 1932.

In this note on the seasonal development of vine mildew [*Plasmopara viticola*] in the region of Montpellier in 1932, it is stated that heavy rains on the 2nd and 5th of June caused very severe outbreaks of the disease on the 13th and 14th of the same month; a light rain on the 13th led the local meteorological station to forecast a further outbreak for the 20th June, and this materialized on the day predicted, in a very severe form. Even wild American vine species (e.g., *Vitis lincecumii*), which are usually resistant, were infected, but on them the fairly numerous mildew patches on the leaves did not spread beyond 1 cm. in diameter and the leaves were not killed.

SARTORIUS (O.). **Peronospora-Bekämpfung mit Staubmitteln in der Rebschule.** [*Peronospora* control with dusts in the Vine nursery.]—*Der Deutsche Weinbau, 1931*, p. 147, 1931. [Abs. in *Zeitschr. für Pflanzenkrankh. und Pflanzenschutz*, xlii, 7–8, p. 396, 1932.]

Grafts of Portuguese vines on 3309 in a German nursery dusted eleven times with cusisa [*R.A.M.*, x, p. 706] were more heavily infected by *Peronospora* [*Plasmopara viticola*] than those given eight applications of 1 per cent. Bordeaux mixture. The former,

however, suffered less retardation of growth than the latter and presented a strikingly green and healthy appearance in October.

RAVAZ (L.). **Chronique. Les bouillies à la chaux. Les brûlures.** [Current events. Lime-containing sprays. Scorching.]—*Prog. Agric. et Vitic.*, xcvii, 24, pp. 569–573, 1 fig., 1932.

The author states that the degree of acidity or alkalinity of Bordeaux mixtures as used in vineyards is easier to regulate when the copper sulphate solution is poured into the lime solution than *vice versa*, the latter method leading to the formation in the precipitate of voluminous vesicles consisting of a lime nucleus surrounded by a wall of a cupric salt, thus preventing a proportion of the lime, hard to determine, from exerting its neutralizing effect on the copper sulphate. The former method, which is in common use in Germany and Switzerland, should be followed also in France, more particularly for the early sprayings, when the vine foliage is still tender and very susceptible to scorching. Field observations indicate that glabrous vine leaves are much more liable to scorching from sprays than the hairy or downy ones.

PETRI (L.). **Rassegna dei casi fitopatologici osservati nel 1931.** [Review of phytopathological records observed in 1931.]—*Boll. R. Staz. Pat. Veg.*, N.S., xii, 1, pp. 1–64, 4 figs., 1932.

This report, which is on similar lines to those of previous years [cf. *R.A.M.*, x, p. 774], contains among numerous others the following items of phytopathological interest.

A wilt of undetermined origin was reported from various parts of Italy as affecting young vines grafted on American stocks. The roots were normal but growth gradually ceased in the previous year's branches, with the result that either the shoots failed to develop or the new branches dried up during the summer. This necrosis progressed from the top downwards, the aerial parts withering completely in two years; finally, the roots and underground part of the trunk were attacked by *Dematophora* [*Rosellinia*] *necatrix* and other soil fungi and the stems by various weak parasites. Apparently, the American stocks had become subjected to some special physiological conditions after grafting, and this had reduced the functional capacity of the graft, with the result that it became highly susceptible to attack by wood-inhabiting fungi.

Bananas from Italian Somaliland showed *Stachylidium theobromae* present saprophytically on wilted organs [ibid., x, p. 806], black tip of the leaves and axis of the inflorescences (*Helminthosporium torulosum*) [ibid., xi, p. 464], and black pit of the fruits usually attributed to the last-named fungus but associated with which Curzi found *Gloeosporium musarum*, *S. theobromae*, and various species of *Fusarium*. A rot of banana shoots in the same region was attributed to a *Pythium* or a *Phytophthora*.

Apple trees growing near Bologna developed a collar rot, the mycelium of a *Phytophthora* being present in the necrosed tissues. A bacteriosis of the branches of apple trees from the same vicinity was also reported as resembling fireblight (*Bacillus amylovorus*); the organism is being identified.

Pseudomonas [*Bacterium*] *juglandis* [ibid., xi, p. 338] was present in young walnut branches in a young plantation near Rome at an altitude of 400 m.

Bitter orange seedlings (*Citrus vulgaris*) [*C. aurantium* var. *bigaradia*] from Eritrea were attacked by *Rhizoctonia* [*Corticium*] *solani*, the disease destroying about one-tenth of the plants.

As Dutch elm disease (*Graphium ulmi*) has already become prevalent over a large part of Italy [see below, p. 810] preparations are being made to grow *Ulmus pumila*, while numerous varieties received from Holland (including *U. davidiana*, *U. karagatch*, *U. elliptica*, *U. pumila*, *U. pumila* var. *pinnato ramosa*, *U. turkestanica*, *U. japonica*, *U. parvifolia*, and *U. wilsoniana*) [ibid., xi, p. 484] have been grafted on to *U. campestris* for inoculation tests.

Spinach in the vicinity of Trieste was attacked by a disease closely resembling the American curly top [ibid., viii, p. 83]; the plants were rachitic and the leaves under-developed, the blades being crinkled, irregular in shape, and asymmetrical, and the mesophyll fleshy and containing much water.

Seedlings of an oriental variety of tobacco received from Lecce were found to be affected with a bacteriosis identified as due to *Bacterium pseudozoogloeae* [ibid., x, p. 62]. The disease is stated to develop in April, causing the formation of rusty spots on the small leaves of the seedlings, which rapidly dry up and die.

A *Phytophthora* determined as *P. terrestris* [*P. parasitica*] caused a foot rot of *Lupinus luteus* in Capua.

Van Poeteren (N.). **Verslag over de werkzaamheden van den Plantenziektenkundigen Dienst in het jaar 1931.** [Report on the activities of the Phytopathological Service in the year 1931.]—*Versl. en Meded. Plantenziektenkundigen Dienst te Wageningen*, 66, 135 pp., 5 pl., 1 diag., 1932.

This report, prepared on the usual lines [*R.A.M.*, xi, p. 95], contains much valuable information, of which the following items may be mentioned. *Septoria nodorum* caused considerable damage to wheat [ibid., vii, p. 425] especially on sandy and marshy soils where the so-called 'reclamation disease' is prevalent [ibid., x, p. 487]. Oats were attacked by *Dilophospora graminis* [*D. alopecuri*: ibid., ix, p. 623], not hitherto recorded on this host, and also by *Ophiobolus graminis*. Good control of barley stripe [*Helminthosporium gramineum*] was given by immersion in germisan (100 gm. in 3 l. water per 65 kg. seed-grain) or U. 520 (25, 50, or 100 gm.), was well as by dusting with ceresan (3 gm. per kg.).

Late blight of potatoes (*Phytophthora infestans*) occurred in an extremely severe form at an exceptionally early date (27th May) on the Eersteling [Duke of York] variety in the north of the country [cf. ibid., xi, p. 123]. Experiments were undertaken to determine the efficacy of various compounds in destroying the foliage in order to prevent infection of the tubers, and it was found that 5 per cent. copper sulphate plus 1 per cent. sodex or agricultural salt answered the purpose very satisfactorily. Tubers of the Bevelander variety from Andel showed the typical symptoms of net necrosis as described from the United States [ibid., x, p. 746]. The progeny

of Eigenheimer potato tubers lifted on 5th July showed 6·2 per cent. mosaic, compared with 32·2 per cent. from those lifted on 22nd September [cf. ibid., viii, p. 457].

The yellowing disease of beets was again widespread [ibid., xi, p. 96] and its cause remains obscure.

Plum trees were killed by *Diaporthe perniciosa* [ibid., vi, p. 463]. Two kinds of pycnidia developed on fragments of diseased bark, the majority being of the *Phomopsis* type while a few belonged to *Cytospora* [ibid., ix, p. 547].

Tomato plants in the Naaldwijk district were extensively damaged by *Colletotrichum tabificum* [*C. atramentarium*: ibid., x, p. 413], while a bacterium believed to be *Aplanobacter michiganense* was also isolated from the same host. At Enkhuizen tomato plants developed a pale, later brown to bronze, and ultimately black spotting and shrivelling of the foliage. The condition, which was infectious and transmissible by grafting to healthy plants, was attributed by Prof. Quanjer to a hitherto undescribed virus. Good control of tomato leaf mould (*Cladosporium fulvum*) was given by spraying with 1 per cent. solbar, followed either by elosal neu [ibid., vi, p. 670] or by dusting with cupulvit [see above, p. 754].

Black salsify (*Scorzonera*) [*hispanica*] was infected by *Sclerotinia* (? *libertiana*) [*S.* ? *sclerotiorum*] which seriously impaired seed production [ibid., x, p. 328], and the same fungus caused a rotting of endives at the stem base. *C.* (?) *macrocarpum* was responsible for a spotting of spinach leaves not previously recorded in Holland.

William Copeland tulip bulbs were found to be infected by *Sclerotium delphinii* [ibid., x, p. 693], while *S. gladioli* was observed on freesia and crocus. *Gloxinia* bulbs from Belgium were infected by *Cylindrocarpon radicicola* [ibid., xi, pp. 243, 460], causing soft, black, sunken lesions. *Pelargonium* leaves showed the small, circular, brown, somewhat depressed spots typical of infection by *Bacterium pelargonii* [ibid., xi, p. 650]. *Colletotrichum* (?) *dianthi* produced black spots, 1 to 2 mm. in diameter, with a red margin on Fürst Bismarck carnation leaves, which finally withered. Studies were conducted on the graft canker of roses associated with *Coniothyrium fuckelii* [*Leptosphaeria coniothyrium*: ibid., x, p. 792].

American oaks (*Quercus rubra*) at Putten were attacked by mildew (*Microsphaera quercina*) which has only once before been observed on this ordinarily highly resistant species in Holland.

Plantesygdomme i Danmark 1931. Oversigt, samlet ved Statens plantepatologiske Forsøg. [Plant diseases in Denmark in 1931. Survey of data collected by the State Phytopathological Experiment Station.]—*Tidsskr. for Planteavl*, xxxviii, 3, pp. 349–390, 1 fig., 1 graph, 1932. [English summary.]

This report, compiled by E. Gram and his collaborators on similar lines to that of the previous year [*R.A.M.*, x, p. 704], contains the following among other items of interest. A list is given showing the number of inquiries received concerning each disease, arranged under the different crops. In addition to oats and barley, swedes, turnips, clover, and lucerne suffered from the reclamation

disease, good control of which was given by the application of copper sulphate to the soil. In many cases the condition was associated with potash deficiency, to which white spots on red clover [*Trifolium pratense*] leaves were found to be due. Grey speck was widespread among cereals, especially in north and west Jutland. The disease was found to be promoted by the use of liquid manure, saltpetre, and lime, as well as by spring tillage, and it was more severe following potatoes than swedes. Favourable results were given by soil treatment with sulphate of ammonia and manganese sulphate. Winter barley affected by this disease was simultaneously attacked by a species of *Ascochyta* new to Denmark, probably *A. graminicola* [ibid., x, p. 10]. Clover, lady's finger [*Anthyllis vulneraria*], and snail medick [*Medicago* sp.] were heavily infected by *Sclerotinia trifoliorum* [ibid., x, p. 670; xi, p. 304], the first-named being also attacked by *Typhula trifolii* and *Gloeosporium caulivorum* [*Kabatiella caulivora*: ibid., viii, p. 151; xi, p. 461].

Potato wart (*Synchytrium endobioticum*) was detected in a few localities of the Copenhagen district and elsewhere.

Among the new records for the country may be mentioned begonia mosaic; a serious bacterial disease of beans [*Phaseolus vulgaris*] investigations on which are in progress; (?) *Erwinia carotovora* [*Bacillus carotovorus*] on greenhouse parsley; *Bacterium marginatum* on gladiolus corms [ibid., x, pp. 438, 645]; *Fusarium* (?) *dianthi* [ibid., x, p. 245] on English carnations; and *Neofabraea malicorticis* [ibid., x, pp. 114, 272] on apples near Lyngby.

SMARODS (J.). **Kultūraugu slimības 1930. un 1931. g.** [Diseases of cultivated plants in 1930 and 1931.]—*Acta Inst. Defens. Plantarum Latviensis*, Riga, ii, pp. 40–43, 1932.

This is a brief annotated list (arranged by the hosts) of the more important diseases of cultivated crops and ornamental plants which were observed in Latvia in 1930 and 1931, all due to well-known parasites.

TEMPANY (H. A.). **Annual Report Department of Agriculture, Straits Settlements and Federated Malay States, for the year 1931,** 56 pp., 1932.

In 1931, the Straits Settlements and Federated Malay States Department of Agriculture in conjunction with the Rubber Research Institute organized a scheme for testing and giving official recognition to proprietary fungicides which may be safely used in the treatment of mouldy rot [*Ceratostomella fimbriata*: *R.A.M.*, x, p. 549] of the tapped bark of *Hevea* rubber. Facilities were provided for the proprietors or agents to have their preparations tested at the Rubber Research Institute, those fungicides that passed the tests satisfactorily being included in a special list.

In the section dealing with the work of the Division of Mycology [by A. Thompson] it is stated that rubber mildew (*Oidium heveae*) was negligible during the period under review, probably owing to regular rainfall after a normal winter. Other records include pink disease [*Corticium salmonicolor*], stem girdling, *Diplodia* [*Botryodiplodia theobromae*], and *Fomes lignosus* on tea; a severe out-

break of leaf disease [*Hemileia vastatrix*: ibid., x, p. 239] on Arabica coffee; *Bacillus* [*Bacterium*] *solanacearum* on tobacco in all parts of Malaya; and *Phytophthora colocasiae* causing appreciable damage to sireh vines [*Piper betle*: ibid., viii, p. 675].

THOMPSON (A.). **Mycological notes.**—*Malayan Agric. Journ.*, xx, 6, pp. 307–309, 1932.

The unidentified species of *Fomes* previously reported as associated with stem rot of oil palms [*Elaeis guineensis*] in Malaya [*R.A.M.*, xi, p. 105] was found on nearly every diseased palm examined during a period of twelve months. The fructification was usually resupinate, and appeared only when the disease had already reached an advanced stage. In attempting prevention it was found to be useless to paint the cut surface of a pruned leaf base unless the wounds caused on the leaf stalk below were also treated, as when they were opened the leaf base tissue was nearly always rotted, even though the surface of the sloped cut might appear to be healthy. The fungus mould (*Thielaviopsis*) [*Ceratostomella paradoxa*; loc. cit.] was always present in wounded leaf and stem tissue and, together with the mycelium of the above-mentioned *Fomes*, in the decaying tissue of palms affected with stem rot.

Notes are also given on *F. lignosus* on oil palms, frog eye (*Cercospora nicotianae*) and slime disease (*Bacillus* [*Bacterium*] *solanacearum*) of tobacco, a die-back of coffee twigs associated with *Gloeosporium coffeanum* [*Glomerella cingulata*: ibid., xi, p. 432], a *Mycothecium*, probably *M. advena* Sacc. growing on coffee leaves in the same pustules as *Hemileia vastatrix*, and a collar rot of tea seedlings induced by unfavourable weather and mechanical injury.

BORG (P.). **Appendix F. Report of the Plant Pathologist.**—*Ann. Rept. on the Working of the Malta Dept. of Agric. during 1931–32*, pp. xv–xix, 1932.

An early outbreak of blight (*Phytophthora infestans*) caused severe injury to the winter crop of potatoes at numerous places in Malta where the fields had not been sprayed with Bordeaux mixture. The disease reappeared in a very virulent form on the spring crop and prompt measures were taken to persuade the farmers to spray properly and at the right time. As a result, scarcely any fields of the spring crop were left unsprayed, and a large number were sprayed under the direct supervision and partly with the help of the staff of the Department of Agriculture [cf. *R.A.M.*, ix, p. 579].

WOOD (JESSIE I.). **Estimated crop losses from diseases in the United States—1928, 1929, and 1930.**—*Plant Disease Reporter, Supplement* 83, 68 pp., 1932. [Mimeographed.]

In a foreword to this compilation N. E. Stevens states that the method adopted to enable a computation of the crop losses to be made is as follows. The actual production is taken to represent 100 per cent. minus the sum of the percentages of loss from all diseases of the crop in question. The possible production is

obtained by dividing the actual production by 100 per cent. minus the total percentage of loss from all diseases of the crop. Thus possible production

$$= \frac{\text{actual production}}{\text{100 per cent.} - \text{per cent. loss from all diseases of crop.}}$$

The percentage loss for the United States is obtained by dividing the total reduction in yield (sum of the State losses) by the possible production for the country. The detailed figures to enable these calculations to be made are provided for a number of the more important crops of the United States in a series of tables, covering the three years from 1928 to 1930.

The total wheat production in the United States in 1928, 1929, and 1930 amounted to 902,749,000, 806,508,000, and 850,965,000 bushels, respectively, the losses from all diseases in the same years being estimated at 67,637,000, 64,532,000, and 41,433,000 bushels, respectively. The total maize production in 1928, 1929, and 1930 amounted to 2,839,959,000, 2,622,189,000, and 2,081,048,000 bushels, respectively, the losses from disease during the same years reaching 237,028,000, 211,809,000, and 122,682,000 bushels, respectively. The potato yields in 1928, 1929, and 1930 were 462,943,000, 357,451,000, and 361,090,000 bushels, respectively, the losses for the three years in question being estimated at 118,927,000, 50,163,000, and 69,843,000 bushels, respectively.

Details of the losses due to the chief individual diseases are included in the tables.

Barrus (M. F.), Boyd (O. C.), & Wood (Jessie I.). **Diseases of plants in the United States in 1930.**—*Plant Disease Reporter, Supplement* 81, 135 pp., 25 maps, 1931. [Mimeographed. Received September, 1932.]

This report, prepared on the same lines as the foregoing [*R.A.M.*, x, p. 81], contains copious notes, supplemented by 64 tables and a number of maps, on the incidence of disease among cereal, forage, fruit and nut, vegetable, and 'special' crops (cotton, hops, and sugar-cane), ornamentals, and trees.

[Tisdale (W. B.)]. **Plant pathology.**—*Ann. Rept. Florida Agric. Exper. Stat. for the fiscal year ending June 30th, 1931*, pp. 105–123, 1931. [Received September, 1932.]

Further studies conducted in Florida into the control of gummosis and psorosis of citrus trees [*R.A.M.*, xi, p. 365] showed that the early stages of both can be controlled fairly readily on orange and grapefruit trees by scraping the affected parts and smearing with a disinfectant paste. On tangerines [*Citrus nobilis* var. *deliciosa*], however, which apparently develop psorosis only, the disease is much more difficult to control, and often quickly breaks out in advance of the places treated even though they are scraped well beyond the margin of the diseased area. Under Florida conditions psorosis, contrary to its reputed behaviour in California, frequently develops with great rapidity. Cultures from the discoloured areas of the inner bark in advance of lesions

of gummosis on grapefruit trees and psorosis on tangerines, in most cases where any organism developed at all, yielded *Diplodia natalensis*.

During the winter of 1930–1 numerous isolations showed that most of the stem-end rot of citrus in Florida was due to *Phomopsis citri* [ibid., x, p. 226]. Out of 185 grapefruit 'buttons' tested, about 8 per cent. yielded pure cultures of this fungus. Evidence was secured that *P. citri* has already penetrated into the buttons when the fruit is harvested.

Controlled inoculation experiments have confirmed field observations that certain tomato varieties are resistant and others susceptible to nail-head spot (*Macrosporium* [*Alternaria*] *tomato*); immature fruits were more susceptible than fully grown ones. Spore measurements were found to be unsatisfactory for distinguishing *A. solani* from *A. tomato* [ibid., xi, p. 680] on tomato plants, but other morphological characters of the spores appeared to be sufficiently constant to differentiate the two species microscopically.

Further investigations into the leaf spot of tomatoes caused by *Stemphylium* [*solani*: ibid., ix, p. 812] showed that the fungus remained viable at room temperature for 14 months.

A wilt of strawberries was observed in Florida in 1930, starting from the older leaves and extending to the youngest, the plants wilting during the day and recovering at night for a few days, after which they succumbed. The affected leaves appeared as if scalded, and the disease was most conspicuous in warm weather. Numerous isolations were made from infected material, 75 per cent. of which yielded species of *Fusarium*, the causal connexion of which with the disease, however, has not yet been established.

In March, 1931, a new strawberry disease which has been termed 'crepe leaf' was observed on Blakemore plants from Arkansas. The affected leaves were crinkled and had narrow, sunken, chlorotic areas, producing a mosaic pattern on the apical third of the leaf blade. The green areas were mostly abnormally dark.

The most effective method of producing brown spot of maize (*Physoderma zeae-maydis*) in the field was to pour a water suspension of the sporangia into the tops of the plants when 3 to 4 feet high. The time required for the disease to develop in plants thus inoculated was 16 days. The disease is usually present in the leaves and stalks below the ear. Sporangia kept for two years under various conditions in the field and in the laboratory retained their virulence. Greenhouse inoculation tests demonstrated that brown spot is not seed-borne. The reaction of inbred lines to artificial inoculation in the greenhouse was no indication of their reaction to the disease under field conditions. Inoculations on the following grasses failed: gama grass [*Tripsacum dactyloides*], Job's tears [*Coix lacryma-jobi*], sweet sorghum, Sudan grass [*Andropogon sorghum* var. *sudanensis*], broomcorn [*A. sorghum* var. *technicus*], everglade millet [*Setaria magna*], foxtail millet [*S. italica*], pearl millet [*Pennisetum typhoideum*], green foxtail [*S. viridis*], and yellow foxtail [*S. glauca*].

Physalospora zeicola Ell. et Ev. was ascertained to be the perfect stage of a *Diplodia* also parasitic on maize.

BURKHOLDER (W. H.). **Carbohydrate fermentation by certain closely related species in the genus Phytomonas.**—*Phytopath.*, xxii, 8, pp. 699–707, 1932.

The capacity of nine species and varieties of phytopathogenic bacteria to ferment 24 carbohydrates was investigated. The organisms used, all of which are referred to the genus *Phytomonas* [*R.A.M.*, iii, p. 18], were *Pseudomonas campestris*, *Bacterium juglandis* [ibid., xi, p. 338], two strains of *Bact. malvacearum*, two strains of *Bact. phaseoli*, one from New York and one from Switzerland, two strains of *Bact. phaseoli* var. *fuscans*, both from Switzerland [ibid., ix, p. 695], *Bact. phaseoli* var. *sojense*, *Bact. vascularum*, *Bact. vesicatorium*, and *Bact. vitians* [ibid., ix, p. 224].

A synthetic peptone-free base was used to which the various carbohydrates were added, the medium being adjusted to P_H 7. The organisms to be tested were first grown on beef extract agar for some 48 hours and then transferred to the carbohydrate media incubated at 27° C.

Contrary to Lewis's observation, one of the strains of *Bact. malvacearum* was able to ferment arabinose [ibid., ix, p. 715]. *Bact. phaseoli* var. *fuscans*, *Bact. vascularum*, and *Bact. vitians* differ from the other members of the group in their incapacity to ferment maltose, the last-named being also unable to hydrolyse starch. *Bact. vascularum* is incapable of utilizing arabinose, lactose, and glycerol. *Bact. phaseoli* var. *sojense* is distinguishable from *Bact. phaseoli* by its capacity to ferment mannitol. In the case of *P. campestris*, *Bact. juglandis*, *Bact. phaseoli* var. *sojense*, and *Bact. vesicatorium* separation is less easy. *Bact. malvacearum* is distinguishable from *Bact. phaseoli* only by its incapacity, as a general rule, to ferment arabinose, and here, as mentioned above, certain anomalies occur.

The plant pathogens under investigation were found to be capable of utilizing the salts of acetic, citric, malic, and succinic acids, from which a considerable amount of alkali was formed in solutions of only 0·15 per cent. of the salt.

JOURNÉE (C.) & LAROSE (E.). **Quelques résultats d'essais sur variétés de Froment.** [Some results of trials with Wheat varieties.]—*Bull. Inst. Agron. et des Stat. de Recherches Gembloux*, i, 1, pp. 19–34, 7 graphs, 1932. [Flemish, German, and English summaries.]

In connexion with a series of experimental studies on different wheat varieties at the Plant Improvement Station, Gembloux, Belgium, it was ascertained that yellow rust (*Puccinia glumarum*) is most severe on the early maturing Institut de Gembloux, 18 A and 18 B, Vilmorin 23, and others of a similar type. Most of the Japanese varieties used in the tests succumbed to this disease, but Akabozu and Shirohada proved highly resistant to *P. glumarum* as well as to cold. On the other hand, the foot rot and straw-breaker fungi (*Ophiobolus graminis* and *Leptosphaeria culmifraga*) [*R.A.M.*, ix, p. 236] caused the heaviest damage on the late ripening varieties, such as Champion.

KIRCHHOFF (H.). **Über den Einfluss der Keimungstemperatur und anderer Keimbettfaktoren auf das Verhalten gebeizten Getreides.** [On the influence of the germination temperature and other seed-bed factors on the development of disinfected cereal seed-grain.]—*Angew. Bot.*, xiv, 4, pp. 349–389, 2 graphs, 1932.

In continuation and extension of the work of Gassner and others on the influence of germination temperature and cognate factors on the development of cereal seed-grain treated with various disinfectants [*R.A.M.*, v, p. 540 *et passim*], the writer carried out a series of laboratory tests at the Brunswick Technical College.

The results of the experiments [which are fully tabulated and discussed] showed that the germination of wheat was least affected by steeping in germisan (1 hour at 2, 4, or 8 per cent.), uspulun (6 hours at 2 or 4 per cent.), arsenic acid (1 hour at 0·1, 0·2, or 0·4 per cent.), and dusting with abavit (9·40 gm. per kg. seed-grain) when the seed-bed (sand) was kept at a low temperature (10° C.), the reverse being the case with formaldehyde (1 hour at 0·4 or 0·8 per cent.) and copper sulphate (1 hour at 2 or 4 per cent.) solutions, and ceresan, tutan, tillantin R, and corrosive sublimate dusts (13·40, 13·40, 9·40 and 9·40 gm. per kg., respectively), which gave better results at 20° and 24° than at 10°. Generally speaking, a low soil moisture content (20 per cent. of the water-holding capacity) resulted in greater injury to germination than a high one (80 per cent.), and a combination of low temperature and low soil moisture was particularly unfavourable in some cases (e.g., with ceresan). The deleterious action of the disinfectants was strengthened by lack of oxygen in the seed-bed. In some cases, e.g., with germisan, this effect was neutralized by exposing the sand in which the seed was sown to a current of oxygen for 24 hours, whereas in others, uspulun for instance, no such benefit was derived. The exposure of the treated seed-grain to carbon dioxide for the first four days after disinfection generally reduced the percentage of germination but curtailed the duration of the process in comparison with the untreated controls. An increase of germination was effected in seed-grain treated with germisan or copper sulphate by watering the sand with Knop's solution or potassium nitrate, and in tutan-treated seed-grain with magnesium sulphate also. Germination was reduced, on the other hand, by Knop's solution following treatment with ceresan, and by potassium nitrate and magnesium sulphate after disinfection with arsenic acid. An acid soil reaction tended to increase the injury from seed treatment.

RABIEN (H.). **Beitrag zur Frage der Schädigung des Saatgutes durch Trockenbeizen.** [Contribution to the question of injury to the seed-grain by disinfectant dusts.]—*Nachrichtenbl. Deutsch. Pflanzenschutzdienst*, xii, 8, pp. 61–62, 1 fig., 1932.

Complaints having been received of serious damage to Carsten's Dickkopf V wheat in the Brunswick district of Germany as a result of treatment of the seed-grain in November, 1931 with abavit B, the following experiment was carried out. Carsten V

seed-grain was treated with three different samples of abavit B (0·2 gm. per 100 gm. seed-grain) and sown (*a*) in the greenhouse at 18° C. and (*b*) in a cold chamber at the Brunswick Institute of Agricultural Botany at 0° to 3° (4th May). No damage to the (*a*) series was observed, but the germinative capacity of the (*b*) seedlings was found, three days after transference to a temperature of 15° (14th July) to have been reduced from 95·5 to 35·5, 38, and 26·5 per cent., respectively, by the three samples of abavit B. The corresponding figures on 22nd July were 97·5 per cent. for the untreated and 96, 91, and 90 per cent., respectively, for the lots treated with abavit B. Further tests with abavit B gave comparable results and further showed that treatment with this substance results in a considerable reduction in the dry weight of the plants. No such adverse effects followed treatment of the seed-grain with germisan (short disinfection process) or tillantin R.

Bodnár (J.) & Roth (Lili E.). **Die Wirkung der Quecksilbersalze auf die Samenkeimung.** [The action of mercury salts on seed germination.]—*Biochem. Zeitschr.*, ccxlviii, 4–6, pp. 375–382, 1931.

The writers carried out experiments at the Institute of Plant Biochemistry, Budapest, on the effect of some simple mercury salts on the germination of wheat seed-grain.

It was found that the mercury ions of mercuric nitrate, mercuric sulphate, and mercuric acetate exert scarcely any action, while the lipoid compounds of mercuric chloride, mercuric bromide, and mercuric acetate adversely affect germination, especially those of mercuric bromide. The effect of the alkalihaloid (alkali chloride and bromide) salts in reducing the injury of the lipoids to the seed-grain may be attributed to the diminution of the lipoid mercury content of the mercuric chloride and mercuric bromide solutions through the formation of the complex salts, mercury methyl chloride and mercury methyl bromide. The injury-reducing action of the potash salts is greater than that of sodium. The slight harmful effect of mercuric acetate is enhanced by the addition of a little sodium chloride but minimized by more of this compound.

These data are considered to be irreconcilable with the theory of Krönig and Paul (*Zeitschr. für Hyg.*, xxv, 1, 1897) that the toxicity and disinfectant action of mercury salts is due to their dissociation.

Roemer (T.) & Kamlah (H.). **Gibt es eine selektive Wirkung der Wirtspflanze (Weizen) auf den Pilz (Ustilago)?** [Is there a selective action of the host (Wheat) on the fungus (*Ustilago*)?]—*Phytopath. Zeitschr.*, v, 1, pp. 41–53, 1932.

In continuation of the investigations initiated by Grevel on the occurrence of physiologic strains in loose smut of wheat (*Ustilago tritici*) [*R.A.M.*, ix, p. 708], the authors tested the reaction of some standard varieties to a collection from Halle (1) and three from Kleinwanzleben (Peragis, 187, and 368/20), the last-named being the most virulent hitherto found in Germany [ibid., xi, p. 666]. In general the results of the studies [which are fully tabulated and discussed] confirmed those obtained by Grevel and indicated that the

virulence of the fungus is greatly influenced by the selective action of the host. By means of crosses between resistant and susceptible varieties it was found possible to develop summer wheats immune from strains 1 and 2 of *U. tritici*. These hybrids combine the characters of Grüne Dame and Peragis on the one hand with those of the Bordeaux type (including Rimpau's Roter Schlanstedter) on the other.

HANNA (W. F.), VICKERY (H. B.), & PUCHER (G. W.). **The isolation of trimethylamine from spores of Tilletia levis, the stinking smut of Wheat.**—*Journ. Biol. Chem.*, xcvii, 2, pp. 351–358, 1932.

Experiments are described which showed, in agreement with the field observations of one of the authors, that of the two species of *Tilletia* responsible for wheat bunt, *T. tritici* and *T. levis* [*T. caries* and *T. foetens*], the latter alone produces the fishy odour commonly associated with this disease. Trimethylamine, to which the authors attribute the odour, was isolated from spores of the latter but was not detected in those of *T. caries*.

PETERSEN (W.). **Vier Jahre genossenschaftliche Getreidereinigung und -beizung.** [Four years of co-operative seed-grain cleaning and disinfection.]—*Ratschläge für Haus, Garten, Feld*, vii, 8, pp. 116–118, 1 fig., 1932.

Co-operative cleaning and disinfection of cereal seed-grain has been practised at Heckelberg, Mark Brandenburg, for the last four years [cf. *R.A.M.*, xi, p. 707], some two-thirds of the winter and one-third of the summer wheat crop being treated. Many farmers are now also treating the rye seed-grain before sowing owing to the increasing prevalence of foot rot [*Fusarium* spp.] in the district of recent years [cf. ibid., x, p. 94]. Barley is almost always disinfected against stripe [*Helminthosporium gramineum*]. Ceresan has given excellent results, applied by means of one of the continuous dusting attachments to the seed-cleaning apparatus [shown by a photograph]. The cost of the treatment is only Pf. 50 per cwt.

STEGEMANN. **Zur Frage der Fusskrankheiten.** [On the question of the foot rots.]—*Deutsche Landw. Presse*, lix, 35, p. 442, 1932.

Commenting on the devastating incidence of foot rot of wheat [*Ophiobolus graminis*] in Schleswig-Holstein during the current year [*R.A.M.*, xi, p. 361], the writer observed that infection was prevalent in crops following a mixture of vetch [*Vicia* spp.] and oats, which is not ordinarily the case. The diseased areas were found to cover only the sites where the vetch had been stacked in the previous year.

ZEINER (W.). **Das Verhalten verschiedener Sommergerstenkreuzungen hinsichtlich der Anfälligkeit für Ustilago nuda.** [The behaviour of various summer Barley hybrids in respect of susceptibility to *Ustilago nuda*.]—Reprinted from *Zeitschr. für Züchtung*, A, xvii, 3, 40 pp., 2 figs., 5 graphs, 1932.

Using Piekenbrock's adaptation of Seiffert's method [*R.A.M.*, vii,

p. 435; xi, p. 710] for the artificial inoculation of barley with loose smut (*Ustilago nuda*) the writer infected 193,000 flowers during the period from 1926 to 1930 in Württemberg, and thus secured 85,000 plants for the determination of infection percentages, the data being fully tabulated and discussed. The best results were obtained by inoculation from five to seven days after the commencement of flowering, under favourable conditions for the germination of the spores. The spores of *U. nuda*, stored in cardboard boxes in the laboratory, were found to retain their viability for over a year. The average loss in the stand of plants from infected seed during 1927–8 was 44·5 per cent., chiefly due to the greatly weakened condition of the seeds from the inoculated flowers. By means of typical alterations in the young ears, e g., elongated growth and partial or total absence of awns, diseased plants may be differentiated from healthy ones some 14 days before the emergence of the spikes [ibid., x, p. 782].

Seiffert observed a high degree of resistance to *U. nuda* in barley varieties of the *inaequale* type, and the writer noticed a similar reaction in Tiroler Nackte 898/21, Blaue Nackte, and Walpersii (all *Hordeum inaequale nudum* varieties), whilst the Australian early, Heil's Franken, and Heine's Hanna (all *H. distichum nutans* vars.) and also Heine's four-rowed (*H. inaequale*) were susceptible, the first-named particularly so. Genetic studies of eight crosses indicated that immunity, resistance, or slight susceptibility to loose smut are consistently inherited according to the Mendelian rules. In cross IV (the moderately susceptible Heil's Franken × the highly susceptible Australian early) transgressive segregation in the direction of greater susceptibility was apparent. Except in cross V (Heil's Franken × Walpersii), in which two factors are involved, resistance of whatever degree was conditioned by one Mendelian factor. The factors for resistance or slight susceptibility are inherited separately. Though the evidence on this point was not conclusive, the indications were that resistance is dominant. There was no indication of transgressive segregation in the direction of resistance in a cross between the two susceptible varieties, Heine's Hanna and Australian early.

The best means of procuring valuable immune selections was found to be by crossing immune or highly resistant varieties with otherwise desirable susceptible sorts. Walpersii and Blaue Nackte can both be recommended as parents, except for the blue coloration of the aleurone layer of the seeds in the latter variety, a character that is frequently inherited by the progeny.

HEWLETT (C. H.) & HEWLETT (J. H.). **Hot-water treatment of seed Barley.—Crop results in Canterbury, seasons 1930, 1931, 1932.**—*New Zealand Journ. of Agric.*, xlv, 2, pp. 104–108, 1932.

In this further report on the results of hot-water treatment of barley seed grain for control of covered smut [*Ustilago hordei*: *R.A.M.*, ix, p. 516] in New Zealand, it is stated that in 1931 some growers reverted to the old system of using their own seed, instead of the smut-free pure strains of barley available to them. One-

third of such crops showed distinct traces of covered smut, which seriously lowered the quality of the grain for milling purposes.

Eglīts (H.) & Eglīts (M.). **Rudzu ziemošanas apstākli un neražas cēloņi 1930/31 g.g.** [Overwintering conditions of Rye and the causes of crop failure in 1930–31.]—*Acta Inst. Defens. Plantarum Latviensis*, Riga, ii, pp. 33–39, 1932. [German summary.]

An extensive enquiry among rye-growers in Latvia in 1931 elucidated the fact that by far the greatest cause of the failure of the crop in that year was the snow fungus (*Fusarium* sp.) [*Calonectria graminicola*], the development of which was favoured by the prolonged persistence of a deep snow cover late into the spring. It is pointed out that less than half of the growers had treated their seed grain against the disease, and in spite of the fact that in most cases the treatment was only partial, 72 per cent. of their number had markedly better stands in the spring than where the grain was not treated, this again demonstrating the practical value of seed disinfection. In field tests at three experiment stations, the best result was obtained with ceresan dust, closely followed by the short steeping process with germisan. Sprinkling the seed with germisan, Preparation No. 1, and rye fusariol was much less effective. There was some indication of a correlation between the type of the soil and the incidence of winter injury, since the rye suffered most on light and least on heavy soil.

Roldan (E. F.). **Pythium root-rot disease of Corn in the Philippine Islands.**—*Philipp. Agric.*, xxi, 3, pp. 165–176, 4 figs., 1932.

Field observations on the root rot of maize in the Philippines previously reported as due to a species of *Pythium* [*R.A.M.*, x, p. 96] showed that the losses from this cause under favourable conditions for the disease may range from 25 to 35 per cent. of the stand of susceptible varieties. Inbred plants of the Native Yellow Flint and White Dent types appear to suffer most. The disease is characterized by a pale yellow discoloration of the foliage, wilting, and rotting of the shanks by secondary saprophytic organisms just above soil level, resulting in the collapse of the plants. The roots die back and later the entire rootstock and a portion of the shank may be involved, the latter assuming a water soaked aspect and emitting an offensive odour.

The fungus isolated from diseased material was found to differ from the closely allied *P. arrhenomanes* [ibid., viii, p. 168; xi, p. 434] in the following particulars. The hyphae of the Philippine species are 1·5 to 4·5 μ in width, compared with 2 to 5 μ in *P. arrhenomanes*; the lobulate sporangia (12 to 15 μ in diameter as against 20 μ) germinate by means of a germ-tube and not by zoospores; the oogonia measure 22 to 39 μ (24 to 35 μ in *P. arrhenomanes*), the antheridia 11 to 23 by 7 to 10 μ (12 to 25 by 6 to 9 μ), and the oospores 21 to 35 μ (22 to 33 μ) in diameter; the number of antheridia in the Philippine species is probably not more than 11, compared with a probable total of 25 or more in *P. arrhenomanes*. On the basis of these differences the Philippine organism

is regarded as a new variety (*philippinensis*) of *P. arrhenomanes*. The comparative measurements of the two fungi are shown in a table, in which some morphological particulars of *P. aphanidermatum*, *P. butleri*, and the Hawaiian sugar-cane *Pythium* [ibid., viii, p. 740 *et passim*] are also included.

Inoculation experiments on maize under controlled conditions resulted in the development of the typical symptoms of root rot. The fungus further readily attacked the roots of sugar-cane and caused slight infection on rice, while little or no injury was produced on ginger, tobacco, and papaw, and the results on mungo beans [*Phaseolus mungo*] and cowpea were entirely negative.

Control measures, based on suitable cultural methods and crop rotation, are briefly indicated.

SENN (P. H.). **The effect of the sugary gene in Corn on resistance to seedling blight caused by Gibberella saubinetii.**—*Phytopath.*, xxii, 8, pp. 675–697, 2 figs., 1932.

Observations in Wisconsin and reports from elsewhere indicate that sweet corn is more severely affected by several diseases than the dent varieties and a study was accordingly made on the effect of the sugary gene in maize on resistance to the seedling blight caused by a single physiological form of *Gibberella saubinetii*. The sugary character is known to be recessive to the non-sugary or starchy one and comparative tests of resistance were made between the sweet and starchy kernels produced on the same segregating ears in heterozygous selfed and crossed plants. Preliminary experiments showed that sugary and non-sugary kernels were equally likely to contain not only *G. saubinetii*, but also other seed-borne organisms such as *Penicillium*, *Rhizopus*, and *Basisporium* [*gallarum*: *Nigrospora sphaerica*: *R.A.M.*, xi, pp. 447, 448]. In the resulting seedlings, however, every group of segregating ears yielded a higher index of resistance to *G. saubinetii* blight in the plants from the non-sugary kernels; when the seedlings were weak, though those from the non-sugary kernels were more resistant, the difference was scarcely significant.

No evidence was obtained that the presence of the other seed-borne organisms mentioned above affected the resistance of the seedlings to *G. saubinetii*.

It is evident from these results that the sugary gene is at least one of the factors responsible for the disparity in resistance to seedling blight shown by the two kernel types. The sugary gene in itself lowers resistance to seedling blight and hence is a limiting factor in the development of a sweet maize possessing the same high degree of resistance found in certain strains of the starchy type.

MORWOOD (R. B.). **Report of Maize Diplodia experiments 1930–31.**—*Queensland Agric. Journ.*, xxxviii, 1, pp. 22–23, 1932.

An experiment conducted in Queensland showed that maize seed-grain slightly infected with *Diplodia* [*zeae*: *R.A.M.*, x, p. 223] and treated with tillantin R gave a better yield but no better germination than did similarly infected, untreated seed.

FAWCETT (H. S.). **Two Phytophthoras of Citrus found in new localities.**—*Plant Disease Reporter*, xvi, 12, p. 130, 1932. [Mimeographed.]

In January, 1932, *Phytophthora citrophthora* was isolated from oranges affected by brown rot in very wet soil near Wildwood, and from grapefruit in wet irrigation ditches near Vero Beach and Palmetto, Florida. It was also isolated from oranges taken from the orchards and a packing house at Buras, Louisiana. Probably the fungus has been present for a long time in these States, but this is the first report of its occurrence.

In February, 1932, *P. hibernalis* [see next abstract] was isolated from oranges showing symptoms identical with those of the brown rot due to *P. citrophthora* near Cucamonga, California. Both fungi were identified by S. F. Ashby.

PITTMAN (H. A.). **Brown rot of Citrus. A serious disease that can be easily prevented.**—*Journ. Dept. Agric. Western Australia*, 2nd Ser., ix, 2, pp. 286–289, 1932.

The author states that until recently brown rot injury to *Citrus* spp. (chiefly oranges and tangerines) in Western Australia was mainly caused by *Phytophthora hibernalis* [*R.A.M.*, x, p. 161 and preceding abstract], but since 1930 the brown rot caused by *P. citrophthora* [ibid., viii, p. 640] (and which is locally termed 'Californian' to distinguish it from the former) has become of considerable importance, especially on lemons. In the author's opinion, this has been brought about by the neglect of spraying by the growers, a practice which he considers as essential in routine work as manuring or proper cultivation. The *P. hibernalis* form of rot, which occurs mainly during the cold winter weather, can be readily prevented by spraying the lower two-thirds of the trees in the autumn, before the onset of rains, with 5–5–50 home-made Bordeaux mixture or with a mixture prepared from a good commercial ready-made Bordeaux powder at the rate of 1 lb. to 5 gall. water. A similar spraying during the winter or very early in the spring gives good control of the 'Californian' form. It is recommended that the trunks should be well drenched with the spray to guard against *P. citrophthora* gummosis [ibid., x, p. 450] which was found on the trunks of citrus trees, especially lemons, in several orchards of the State. Spraying the soil around the trees is beneficial both by keeping down sources of infection, which is carried from year to year in diseased citrus tissues in the soil, and also owing to the stimulating effect of copper sulphate on the trees. Control of the diseases is facilitated by removing all excess branches, so as to ensure good penetration of air and light to the centre of the crown, and also by the removal of low branches which tend to drag on the ground, so as to leave at least a foot of clear space above the ground all around the tree.

Both forms of brown rot occur with much greater severity on heavy clay soil with a high moisture content than on lighter and better drained soils, for which reason drainage should be improved where it is defective.

The paper also gives a brief description of the leaf and fruit symptoms, which are very much the same for both organisms.

NOBLE (R. J.). **Australia: a disease of Citrus recorded in New South Wales for the first time.**—*Bull. Internat. Inst. Plant Protect.*, vi, 8, p. 131, 1932.

A species of *Septoria*, probably *S. depressa* recorded by McAlpine on oranges and lemons in Victoria in 1899, has been observed for the first time last season in New South Wales on the fruit and foliage of the same hosts. Only one small isolated area is affected at present, but the disease appears to be of potential importance.

DAVIDSON (J.). **Some observations on the causes of the surface blemishes of Oranges in South Australia.**—*Journ. Dept. Agric. S. Australia*, xxxv, 12, pp. 1381–1387, 2 pl., 1932.

This is a brief account of a preliminary investigation which indicated that the surface blemishes other than those caused by fungi, which were observed on oranges during the 1931–2 season in South Australia, may be divided into three classes, namely, (*a*) those due to weather conditions, particularly the action of the wind in causing the fruit to be rubbed against leaves, twigs, and the like, at various stages of its development; (*b*) those caused by insects; and (*c*) those caused by the escape of oil from the oil vesicles in the rind following injury from the first two causes. The paper terminates with a brief discussion of the measures which may lead to the control of these troubles.

STEVENS (F. L.). **Two fungous invasions often following the Coconut leaf miner, Promecotheca cumingii Baly.**—*Philipp. Agric.*, xxi, 2, pp. 80–82, 2 figs., 1932.

Coco-nut leaves in the Philippines are liable to infection by two fungi, which frequently follow invasion by the leaf miner (*Promecotheca cumingii*), viz., *Pestalozzia palmarum* [*R.A.M.*, x, p. 79] and *Epicoccum cocos* n. sp.

The dull silver-coloured, oval lesions of *P. palmarum* usually measure 12 by 6 mm. in diameter but may reach 18 mm. in length; they are heavily studded with punctiform or elongated, black acervuli, usually on the upper surface but occasionally on the lower tan-coloured one. Each spot is sharply bordered by a honey-coloured rim, and they often centre round a wound due to oviposition of the leaf miner and subsequent parasitization of the egg or larva. When *P. palmarum* invades the leaf through the insect channels it forms rectangular spots of variable extent.

E. cocos n. sp. produces numerous dark tan-coloured to brown spots, 2 by 3 or up to 18 by 6 mm., bordered by a brown line. The black, globose sporodochia, 75 to 120 μ in diameter, are usually hypophyllous, occasionally epiphyllous, and are often unequally distributed over the spot; they occupy more than half the stomata in the affected region and the underlying tissue is densely packed with mycelium. The conidiophores are septate and much branched, and form by union of their bases a pseudoparenchymatous central region of the sporodochium. The smooth, brown, globose to ovate conidia, slightly pointed at one end, measure 3 μ in diameter (6 by 3 μ when ovate) and are formed terminally on short branches.

HUSAIN (M. A.). **Leaf-curl in Cotton and other plants.**—*Nature*, cxxx, 3278, p. 312, 1932.

The title of Mathur's recent communication 'Leaf-curl of Cotton in garden Zinnias in North India' [*R.A.M.*, xi, p. 573] suggests that the virus causing leaf crinkle of cotton in the Sudan is identical with that responsible for a similar condition in zinnias at Dehra Dun, a fact that has not yet been established.

Leaf curl or crinkle is stated to be common in the Punjab on potato, tomato, chilli [*Capsicum annuum*], cucurbits, and other plants, but so far no leaf crinkle has been found on cotton associated with *Bemisia gossypiperda*, although scarcely a leaf is free from whitefly infestation. Definite evidence as to the identity of the virus should be obtained in order to avoid confusion between crinkle in cotton and analogous conditions in other plants.

DHARMARAJALU (K.). **A study of the pathological anatomy of the Cotton plant in connection with the wilt disease.**—*Indian Journ. Agric. Sci.*, ii, 3, pp. 293–313, 2 pl., 21 figs., 1932.

Tested on the primary radicle of germinated seeds of three cotton varieties, susceptible (Dharwar I), resistant (Dharwar II), and immune (Gadag I), the mode of entry and early stages of the progress of the wilt fungus (*Fusarium vasinfectum*) [*R.A.M.*, xi, p. 453] were found to be identical. Penetration of the main (tap) root occurs through the epidermis behind the growing point, apparently by mechanical pressure, and the hyphae reach the protoxylem by about the eighth day after inoculation in the susceptible variety. In the other two varieties a layer of cork is formed at the point of infection and the outer epidermal walls become suberized, but the hyphae were able to penetrate into the cortex as before, reaching the endodermis on the eighth day and the xylem shortly after.

The susceptible Dharwar I was found to become resistant at temperatures above 32° C., whereas the resistant Dharwar II became susceptible below 25°, and even Gadag I showed a slight degree of infection at the lower temperature. Under the latter conditions the inoculated plants of all three varieties showed suberization of the epidermal and cortical cell walls (one or two layers), while a small amount of peripheral cork also developed more prominently under the points of infection; the controls showed suberization only of the epidermal walls. At higher temperatures (32° to 34°) there was no mortality among the Dharwar II and Gadag I plants. At these temperatures the peripheral cork was thick in the infected roots of all varieties, and not only was suberin formed in advance of invasion by the fungus in the epidermal and cortical cells, but the cell contents were more or less disorganized in all the varieties.

It is concluded that the development of peripheral cork and wall suberization, though highly important, are not the main causes of resistance to cotton wilt, which appears to reside mostly in the nature of the host protoplasm.

Vouk (V.) & Klas (Zora). **Über einige Kulturbedingungen des insektentötenden Pilzes Metarrhizium anisopliae (Metsch.) Sor.** [On some factors affecting the culture of the insectivorous fungus *Metarrhizium anisopliae* (Metsch.) Sor.]—*Acta Bot. Inst. Bot. Univ. Zagrebensis*, vii, pp. 35–58, 2 figs., 1 graph, 1932.

Laboratory experiments [the results of which are fully discussed and tabulated] at Zagreb, Jugo-Slavia, showed that the temperature range for the normal growth of the insectivorous fungus, *Metarrhizium anisopliae* [*R.A.M.*, xi, p. 456], is relatively limited (10° to 30° C.), the optimum for growth and fructification occurring at 24° to 26° and the thermal death point lying between 55° and 60°. Development took place at a range of hydrogen-ion concentrations from P_H 4·7 to above 10, with an optimum at 6·9 to 7·4. Both organic and inorganic nitrogen were utilized by *M. anisopliae*, the sources of the former including peptone (specially favourable to growth) and asparagin and of the latter ammonium sulphate, ammonium nitrate, and potassium nitrate. Carbon was obtained from glycerine and a number of carbohydrates, namely, glucose, levulose, arabinose, galactose, saccharose, and inulin. Light arrests the growth of the fungus, which further requires a considerable degree of moisture for its development. Mass cultures of *M. anisopliae* are readily obtainable on boiled rice, 1 sq. cm. of the surface of the medium yielding 0·3258 gm. of spores, or approximately sufficient, when mixed with starch in the proportion of 10 : 1, for the dusting of one full-grown maize plant against the European corn borer [*Pyrausta nubilalis*]. Thus, 3 kg. of spores would be enough for two treatments of a field containing some 100,000 plants.

Almeida (F. P.). **Considérations sur les genres Coccidioides immitis et Pseudococcidioides mazzai.** [Some reflections on the genera *Coccidioides immitis* and *Pseudococcidioides mazzai*.] —*Comptes rendus Soc. de Biol.*, cx, 17, pp. 137–138, 1932.

From a study of the relevant literature [which is briefly summarized], together with the comparative examination of cultures of *Coccidioides immitis* and *Pseudococcidioides mazzai* [*R.A.M.*, vii, p. 719; xi, p. 643], the writer is convinced that these organisms are substantially identical. *P. mazzai* therefore should become a synonym of *C. immitis*.

Falchi (G.). **Recherches sur les dermatomycoses. Note 1e. A propos du polymorphisme de certains Dermatophytes.** [Researches on dermatomycoses. First note. On the polymorphism of certain Dermatophytes.]—*Boll. Sez. Ital. della Soc. Internaz. Microbiol.*, iv, 3, pp. 80–87, 1932.

When *Trichophyton gypseum* var. *farinulentum* from pus and hair, respectively, was grown on identical media at laboratory temperature the culture obtained from the hair became after 20 days markedly different from that obtained from the pus. The former showed numerous conidial clusters, fertile hyphae with aleuria, delicate mycelial spirals, and indications of spindle formation; the latter, on the other hand, showed a more pronounced

mycelial development, with fewer conidial clusters and spindles, revealing a distinct tendency to assume the normal appearance of this phase of pleomorphism. After the first transfer, both cultures grew slowly and regularly. That taken from the hair appeared to be normal, i.e., showed a slightly depressed central hump and a finely pulverulent star-formation, while the culture from pus showed a very irregular, undulating central hump. After the third transfer, the two cultures became almost alike, and after the fourth they were in all respects identical. When inoculated into guinea-pigs the two original cultures produced quite distinct symptoms, whereas when those from the fourth transfer were used normal symptoms developed in every case.

Similar differences were observed with *T. rosaceum* and *T. faviforme album* [*T. album*: *R.A.M.*, xi, p. 373].

In view of these facts the author emphasizes the need for caution in establishing new species based on characters that may be only transitory and due to the special conditions of the environment.

FALCHI (G.). **Recherches sur les dermatomycoses. Note II^{e}: Sur la possibilité de démontrer la présence d'éléments mycéliaux dans l'exsudat des trichophyties inflammatoires (folliculites, kérion).** [Researches on dermatomycoses. Second note. On the possibility of demonstrating the presence of mycelial elements in the exudate of inflammatory trichophytoses (folliculitis, kerion).]—*Boll. Sez. Ital. della Soc. Internaz. Microbiol.*, iv, 3, pp. 88–92, 1932.

In the pus accompanying inflammatory trichophytoses (*Trichophyton* spp.) the author found conidia present, an observation which he states he has not seen previously recorded. As the lesions healed, the conidia became progressively fewer, being eliminated by the high phagocytic power of the leucocytes (histiocytes). The importance of these studies in the diagnosis of skin diseases of this type is discussed.

NEGRONI (P.). **Constatation du Trichophyton areolatum Negroni en Argentine.** [The detection of *Trichophyton areolatum* Negroni in the Argentine.]—*Comptes rendus Soc. de Biol.*, cx, 17, pp. 139–140, 1932.

In December, 1931, the writer isolated from the scalp of an Argentine child the same species of *Trichophyton* as that obtained by him from a similar case in 1929 in Sabouraud's laboratory in Paris, namely, *T. areolatum* [*R.A.M.*, ix, p. 182]. The colonies on Sabouraud's medium are sharply divided by a circular furrow into a dirty reddish-purple central portion covered with a very fine, short, woolly 'duvet', and a peripheral area consisting of four zones, the first (nearest the furrow) red and prominent, the second white and pulverulent, the third dirty white, smooth, glistening, and damp, and the fourth poorly defined and composed of radiating branched hyphae. The fructifications consist of aleuria borne either on simple hyphae (thyrses) or on hyphal clusters, in addition to arthrospores and chlamydospores.

Negroni (P.). **Trichophyton lacticolor de la teigne spontanée du cobaye.** [*Trichophyton lacticolor* from spontaneous ringworm of the guinea-pig.]—*Comptes rendus Soc. de Biol.*, cx, 17, pp. 140–141, 1932.

From two cases of ringwórm on the heads of guinea-pigs in the Argentine the writer isolated *Trichophyton lacticolor* [*R.A.M.*, x, p. 106], which forms flat, discoid, pulverulent, yellowish-white colonies intersected by shallow furrows on Sabouraud's medium. The fungus is pleomorphic in cultures on media with artificial sugars. The fructifications consist of dense clusters of aleuria in spirals, arthrospores, and chlamydospores. Inoculation experiments on guinea-pigs resulted in the development of typical lesions, followed by spontaneous healing.

Eglīts (H.). **Linu slimības un Linseklu kodināšanas meginājums 1929–1931. g.** [Flax diseases and Flax seed disinfection experiments during the period 1929 to 1931.]—*Acta Inst. Defens. Plantarum Latviensis*, Riga, ii, pp. 5–32, 1932. [German summary.]

Since the publication of the former report [*R.A.M.*, ix, p. 246] the following additional fungi have been found attacking flax in Latvia: *Polyspora lini* [ibid., x, p. 597], *Diplodina lini* [ibid., x, p. 344], and *Botrytis cinerea* [ibid., viii, p. 151; ix, p. 665], the last-named of which was occasionally observed causing a rot of the tops and seed capsules on weakly plants. The results of continued seed disinfection experiments [which are presented in tabular form] have again confirmed the good effect of the treatment on the yield. The increase in yield of long fibres as a result of seed treatment appears to vary from year to year, in dependence on some as yet undetermined factor or factors; in 1929 it was as high as 35 to 58 per cent., while in 1930 it varied from 3·75 to 13·66 per cent. The best control of seed-borne diseases was given by germisan (short steeping process), while fungicidal dusts (fusariol and tutan) gave less reliable results. Flax seeds treated with germisan or dusted with fusariol or tutan were kept for three months after treatment without any adverse effect on their viability. Seed disinfection also considerably improved the technical qualities of the fibre and the oil content of the seeds.

Grieve (B. J.). **Rose diseases and their control.**—*Journ. Dept. Agric. Victoria*, xxx, 7, pp. 362–364, 1 fig., 1932.

The diseases dealt with in this further instalment of the author's series of papers on rose diseases and their control [*R.A.M.*, xi, p. 516] are downy mildew (*Peronospora sparsa*) [ibid., vii, p. 326], not yet recorded in Australia, and grey mould or blossom blight (*Botrytis cinerea*) [ibid., v, p. 491; see also iv, p. 44; vii, p. 721], reported in New South Wales in 1915.

Westcott (Cynthia). **Coniothyrium diplodiella (Speg.) Sacc. on Rose.**—*Plant Disease Reporter*, xvi, 11, p. 124, 1932. [Mimeographed.]

A fungus on a rose plant (Madame M. Cazin variety) from France, intercepted at the Bureau of Plant Quarantines, United States

Department of Agriculture, was identified by the writer as *Coniothyrium diplodiella*, the causal organism of white rot of grapes [*R.A.M.*, xi, p. 692]. On the rose the subepidermal, erumpent, oval, conical, or spherical, dark pycnidia, with short beaks or none, measure 121 to 249 μ by 107 to 178 μ (average 197 by 140 μ). The dark brown, uni- to biguttulate, ovoid, lenticular, or navicular conidia measure 7·6 to 13·2 by 4·5 to 9·1 μ (average 10·6 by 6·8 μ) and are borne on conidiophores 13 to 45 μ (average 24 μ) by 2 μ in diameter. This is believed to be the first record of the fungus on rose and possibly on any plant outside the genus *Vitis*.

MARTELL (K.). **Krankheiten der Chrysanthemen.** [Diseases of Chrysanthemums.]—*Gartenflora*, lxxxi, 8, pp. 200–202, 1932.

Popular notes are given on the symptoms and control of some chrysanthemum diseases and pests in Germany, including *Septoria rostrupii*, *S. chrysanthemella*, rust (*Puccinia chrysanthemi*) [*R.A.M.*, ix, p. 247], mildew [*Oidium chrysanthemi*: ibid., ix, p. 456], crown gall (*Bacterium tumefaciens*), *Botrytis cinerea*, and *Verticillium albo-atrum* [cf. ibid., xi, p. 375].

MCWHORTER (F. P.) & WEISS (F.). **Diseases of Narcissus.**—*Oregon Agric. Exper. Stat. Bull.* 304, 41 pp., 21 figs., 1932.

Recent tests at the Oregon Agricultural Experiment Station having shown that the so-called 'gray disease' of narcissus (daffodil) is transmissible from infected to healthy plants by leaf mutilation and other mechanical methods applicable to mosaic diseases [*R.A.M.*, x, p. 578], the use of the name mosaic in place of gray disease is now recommended. In addition to the well-known English variety Sir Watkin, which is a conspicuous example of deterioration due to mosaic, a number of other commercial types are affected, including Minister Talma, Cervantes, Weardale Perfection, Lucifer, Orange Phoenix, and Princeps, while van Waveren's Giant and Tresserve are usually very resistant. Some promising new varieties, e.g., Jolyon, have had to be discarded on account of their susceptibility to mosaic. The yield of mosaic stock averages less than 75 per cent. of that of healthy bulbs. A marked symptom in certain varieties, e.g., King Alfred and its hybrids, is a corkscrew twisting of the leaves, while Sir Watkin tends to bend in the plane of the leaf blade. The mottling, marbling, and striping due to the irregular distribution of chlorophyll assume various forms according to the colour and texture of the leaves. Raised, gall-like, elongated areas may develop along the veins. The flowers of mosaic plants are reduced in size, with abnormally thin tissues and short stalks, and they frequently show pronounced hyaline streaks or translucent, cleared areas in the tubes and perianth segments. The latter symptom is particularly noticeable in the vivid yellow varieties, such as Sir Watkin and Weardale Perfection. Some observations are made on various abnormalities liable to confusion with mosaic, together with notes on the spread and control of the disease.

Fungous diseases of narcissus bulbs may be divided into two groups, viz. A (shallow scale and neck rots), including wet scale rot or white mould caused by *Sclerotium rolfsii* (with *S. delphinii*)

[ibid., xi, p. 748] or certain wood-rotting fungi (chiefly *Armillaria mellea*) [ibid., xi, p. 376]; dry scale rot or black scale speck, of which two forms may be distinguished, i.e., a large scale speck apparently caused by a saprophytic sclerotial fungus, and a small scale speck due to an organism closely resembling *Sclerotinia gladioli* [ibid., xi, p. 666]; and neck rot, in part the small scale speck disease and partly due to *Stagonospora curtisii* [ibid., x, pp. 583, 795] and *Botrytis narcissicola* [ibid., xi, p. 460], the causal organisms of leaf scorch and 'smoulder', respectively, as well as to insects and chemical injuries. B (internal scale and basal rots), comprising soft rot (*Rhizopus nigricans*), basal rot (*Fusarium* sp.) [ibid., ix, p. 186; xi, pp. 376, 699], and root plate rot, associated with various fungi. Basal rot is characterized by a fairly dry, chocolate- or purplish-brown decay of the tissues, beginning in the root plate or at the base of the scales and spreading inwards. It is primarily a storage and transit disease but may also attack the bulbs during the later stages of growth in the field. Fairly high temperatures (round 70° F.) are necessary for infection by the basal rot *Fusarium*; if the soil temperature averages 75° to 80° the bulbs are likely to rot in the ground. The large trumpet types are the chief sufferers from basal rot, most of the Incomparabilis, Barri, and Leedsii varieties being resistant while the Polyanthus group is practically immune.

Ramularia blight (*R. vallisumbrosae*) [ibid., x, p. 462] is readily distinguishable from all other narcissus diseases by the conspicuous masses of fluffy white spores covering the leaves, which are rapidly withered so that the bulbs ripen prematurely, besides being reduced in quantity owing to the loss of the shoots.

Full directions are given for the disinfection of narcissus bulbs by various chemical treatments, either in conjunction with hot water or independently. For use after the hot-water treatment the writer recommends ceresan or mercurous chloride (calomel) at the rate of 1 lb. to 8 galls. water, formaldehyde (1 pint to 12½ galls.), or mercuric chloride (1 oz. to 6 galls.). The time of immersion should be one to two minutes for ceresan and calomel, and 15 for formaldehyde and mercuric chloride. If these substances are used independently of the hot-water treatment, the period of immersion should be increased to two to five minutes with ceresan and calomel, and to 30 minutes or one hour with formaldehyde and mercuric chloride. If it is necessary to apply any treatment during storage, the bulbs may either be dipped in ceresan (1 lb. to 10 galls.) for one to two minutes or dusted with ceresan mixed with three parts of talc or hydrated lime.

Ikeno (S.). **A preliminary report of a new Septorial leaf-spot disease of the Lily leaves.**—*Agric. & Hort.*, vii, pp. 1421–1439, 2 pl., 1932. (Japanese, with English résumé.) [Abs. in *Japanese Journ. of Botany*, vi, 2, p. (35), 1932.]

Elongated, brown lesions on *Lilium auratum* leaves in Japan are stated to be due to a new species of *Septoria*, *S. lilii*. On nutrient media some of the mycelial cells swell and develop into chlamydospores; conidia but no pycnidia are produced. The fungus grows between 0° and 32° C. with an optimum at 20° to 24°. The

conidia succumb to ten minutes' immersion in water heated to 53° and to five minutes at 55°.

KOEHLER (B.) & JONES (F. R.). **Alfalfa wilt as influenced by soil temperature and soil moisture.**—*Illinois Agric. Exper. Stat. Bull.* 378, 79 pp., 12 figs., 6 graphs, 1932.

Surveys of the prevalence of bacterial wilt of lucerne (*Phytomonas* [*Aplanobacter*] *insidiosum*) in Illinois [*R.A.M.*, x, pp. 13, 192] in 1925 and again in 1930 show the disease to be on the increase. In the latter year it was estimated to be present in 65 per cent. of the fields of two years old or more in the State.

The results [which are fully discussed and tabulated] of soil and air temperature and soil moisture experiments under controlled conditions indicated that, within a soil temperature range of 10° to 30° C., the percentage of plants successfully inoculated through cut stems increased with rising temperatures. The weight of the roots of the diseased plants was diminished more than that of the tops, so that the conditions of the crops was really poorer than would be judged from their above-ground appearance. The percentage of infection increased with the soil moisture up to 65 per cent. of the water-holding capacity.

The bacteria in naturally infected plants are characteristically lodged in the pits of the vessels against the primary wall. In very young vessels the bacteria were sometimes found in all the pits, while they were usually restricted to rows of pits in older ones, and to only a few of those of full-grown vessels. In artificially inoculated material, on the other hand, the characteristic lodgement of the bacteria in the pits is absent, and the organisms are found attached in masses to the inner thickenings. In infected sweet clover [*Melilotus alba*] roots, the young vessels often contain rounded bacterial masses attached to the series of pits while only a few occupied the lumen. In autumn wood the bacteria may dissolve the middle lamella of the walls of all contiguous cells, thus separating the vascular elements. This phenomenon has not been observed in spring or summer wood, in which the liberation of the organisms is apparently effected by the dissolution of the thin primary wall of the vessel and the development of the bacteria in a thin layer in the middle lamella of contiguous cells.

Comparative chemical analyses showed that the sugar content of diseased lucerne plants is lower and the crude fibre content higher than that of healthy ones.

CARDINELL (H. A.) & GASTON (H. P.). **Comparisons of methods of making spray applications.**—*Michigan Exper. Stat. Special Bull.* 220, 25 pp., 7 figs., 7 graphs, 1932.

The results of orchard experiments [details of which are given] over four years in the State of Michigan showed that adequate control of apple scab [*Venturia inaequalis*] and insect pests is given equally by any of the spraying methods now in common practice, provided the applications are thorough and timely. Where spraying tanks working under pressure were used, a considerable saving in time and materials was realized by one man operating from the top of the tank, as against two men working

together from the ground. All things taken into consideration, the most favourable pressure inside the tank was found to be between 300 and 400 lb. Heavy pruning of the crown of large apple trees did not materially reduce the quantity of spray material used, nor did it give better control of the scab and pests. No significant differences in control or foliage injury were observed between blocks sprayed during the day and at night.

In another series of tests, dusting the trees was found to be between two and three times as rapid as spraying, while giving essentially the same control as the latter method, and the higher cost of the materials was offset by the saving in labour.

HAMILTON (J. M.). **Recent investigations on the control of Apple scab in the Hudson Valley.**—*New York (Geneva) Agric. Exper. Stat. Bull.* 604, 44 pp., 3 graphs, 1932.

The results [which are fully discussed and tabulated] of an extensive series of trials in the Hudson Valley during 1930–1 on the relative efficacy of various methods of apple scab [*Venturia inaequalis*] control indicated that timeliness and thoroughness of application are more important than the selection of any one of the more promising treatments [see preceding abstract]. Lime-sulphur 1 in 40 is recommended as giving the greatest margin of safety of the materials tested, but certain wettable sulphurs, e.g., Koppers flotation sulphur paste 5–50 [*R.A.M.*, xi, p. 520], proved commercially satisfactory, while kolofog 4–50, technically known as bentonite sulphur [ibid., x, p. 671; xi, pp. 385, 560], prepared by the Niagara Sprayer and Chemical Co., was almost equally efficacious. Dry lime-sulphur 5–50, which is approximately equal to the liquid at 1 in 40, also gave good control. The standard dry-mix may be reduced from 16–8–1 to 12–8–1 and the value of the lime is questionable under local conditions. Lime at the rates of 3–50 to 10–50 did not enhance the fungicidal value of lime-sulphur 1 in 40, 1 in 60, and 1 in 80. Lime-sulphur 1 in 40 was the most adherent of the sprays tested, while the greatest loss of sulphur occurred in the dry-mix.

MILLER (E. V.). **Some physiological studies of Gloeosporium perennans and Neofabraea malicorticis.**—*Journ. Agric. Res.*, xlv, 2, pp. 65–77, 2 pl., 11 graphs, 1932.

After a reference to the economic importance in the Pacific North-west of the apple perennial canker (attributed to *Gloeosporium perennans*) [*R.A.M.*, xi, p. 656] and north-western anthracnose (*Neofabraea malicorticis*) [ibid., x, p. 114; cf. also p. 272], the author gives details of his cultural studies of the two organisms, which were undertaken in the hope that their physiological responses might throw some light on their relationship, and also be of value in developing control measures. Both on synthetic media and when inoculated into apple fruit the two fungi responded in a very similar way to increases in temperature from 0° to 20° C., and in apples the radial growth of both fell off slightly between 15° and 20°. Both germinated at 0° and rotted the fruits at that temperature; macrospores were readily obtained on the fruits, their production being very abundant at 10°. The absence from the

nutrient media of potassium chloride or sodium nitrate appeared to have a slight retarding effect on the growth of either organism, and neither was able to start growth at P_H values of 2 and 12; both made similar growth within a P_H range from 3 to 11·8, a definite retardation of initial growth being noted below and above these points. Tannic acid retarded the growth of *N. malicorticis* much more markedly than that of *G. perennans*. It is pointed out that, in general, there was greater variability in the responses of the different strains of the same species than between the two species themselves.

REINECKE (O. S. A.). **Prune production. How to improve size and quality.**—*Farming in South Africa*, vii, 76, pp. 155–156, 1932.

In connexion with a study of the factors affecting the quality of South African d'Agen prunes for export purposes, it is stated that rust [*Puccinia pruni-spinosae*] has a marked adverse effect on the following year's crop, especially after a wet late summer. Affected leaves fall early, before growth has ceased, with the result that the tree comes into flower in the late summer or early winter. The largest and most valuable fruit buds are forced into premature blossoming at this time, so that the following season's crop is substantially reduced. A dormant spray should be given, followed by one or more applications of Bordeaux mixture as soon as the rust appears on the under side of the leaves.

ENDO (S.). **On Cercospora circumscissa Sacc., pathogenic on the leaves of Prunus mume S. et Z.**—*Trans. Tottori Soc. Agric. Sci.*, ii, pp. 249–252, 1931. [Abs. in *Japanese Journ. of Botany*, vi, 2, p. (28), 1932.]

In cultures of *Cercospora circumscissa*, parasitic on *Prunus mume* leaves in Japan [*R.A.M.*, viii, p. 120], chlamydospores develop readily while conidial production is restricted. The optimum temperature for the growth of the fungus was found to be 24° to 28° C.

CATION (D.). **Three virus diseases of the Peach in Michigan.**—*Michigan Agric. Exper. Stat. Circ. Bull.* 146, 11 pp., 2 figs., 1932.

Following a brief historical survey, comparative descriptions are given of three virus diseases affecting peaches in Michigan, viz., yellows, little peach, and red suture, the last-named having steadily increased since its first detection in the State (to which it is apparently confined) in 1911 [*R.A.M.*, x, p. 364]. Yellows was first observed in Michigan in 1863 [cf. ibid., xi, p. 521] and little peach in 1893, the latter being now the more serious disease of the two.

Red suture is most conspicuous during ripening, when the fruit shows an uneven contour, with heavier ridges usually running lengthwise with the suture, the ridge of which may also be abnormally raised. The exposed side of affected fruits shows a deep red to purple blush, which is most intense on the apices of the ridges. The prematurely ripened side of the peach is excessively watery

and readily crushed, and the flavour of the fruit is somewhat insipid. The foliage of diseased trees is yellowish-green or bronzed, and the tips of the leaves unusually pale, while the smaller leaves of a cluster are also often of a lighter colour. In severe cases the leaves turn downward and inward with an occasional twisting of the petiole. Terminal growth is generally curtailed. Leaf clusters frequently sprout from most of the buds on a branch, and numerous short shoots arise along the main branches near the base. Such shoots have shortened internodes and are of small diameter but not long and wiry as in yellows. This feature, together with the abnormal number of leaf clusters near the centre of the tree, gives a feathery or fuzzy appearance characteristic of red suture, and to some extent also of little peach. In June, 1932, the Rochester variety showed marked symptoms of red suture, while South Haven was scarcely affected and the reaction of Elberta, Hale, and Gold Drop was intermediate.

The virus diseases of peach are best controlled by careful cultural methods, including insect extermination, and thorough roguing of infected trees.

Willison (R. S.). **Wound-gum in Peaches and Grapes. Its relation to the invasion of fungus wound-parasites.**—*Scient. Agric.*, xii, 7, pp. 402–419; 8, pp. 484–505, 9 pl., 2 figs., 3 graphs, 1932.

A detailed account is given of investigations conducted in Canada to ascertain the nature of the yellow gummy substance produced in the dead arm disease of the vine (*Cryptosporella viticola*) [*R.A.M.*, vii, p. 360] and whether this substance, in which the mycelium of the causal organism is sometimes embedded, is in fact wound gum, whether it is present in uninfected stems, and if so, whether it bars the advance of the fungus. Parallel experiments were made on peach trees inoculated with a *Cytospora* isolated from peach cankers and twigs affected with die-back, and with a *Sclerotinia* [? *S. americana*: ibid., xi, p. 249] obtained from peaches showing brown rot and incipient cankers. The results [which are fully discussed] may briefly be summarized as follows.

When the parenchymatous cells of wood or bark die under certain conditions of temperature and moisture, their contents become changed into yellowish or brownish decomposition products, more or less resistant to solvents. If the cells dry out rapidly, less brown material is produced than is the case when they die under moist conditions; starch, if present, does not disappear under dry conditions. In the peach the decomposition products ooze out into the vessels, forming colourless, later yellow plugs of wound gum which become lignified, especially on the line of demarcation between living and dead wood. The wound gum is insoluble and does not swell in hot or cold water. In vines plugs of wound gum are not formed in the vessels, which contain a jelly formed from the sap; this jelly swells and is at least partially soluble in water. When permeated with the mycelium of *C. viticola* it sometimes turns yellow and resembles wound gum. In the peach, injured meristematic tissue while active forms gum pockets owing to the dissolution of the middle lamellae. These pockets become filled

with gum produced by pectic substances and the disorganization of the cell contents; if exuded, the gum apparently undergoes no further change, remaining partly soluble and quite capable of swelling in water. If it becomes embedded in the wood it acquires the characteristics of wound gum and is often partly or completely impregnated with lignin.

Vine branch tissues discoloured by the presence of the products of decomposition are unable to prevent the wood from becoming invaded by *C. viticola* when there is sufficient moisture to allow the spores to germinate. The hyphae of *Cytospora* and *Sclerotinia* are able to penetrate wound-gum plugs in peach wood, penetration being preceded by the formation of appressoria and effected by means of slender penetration threads. In nature, *Sclerotinia* is found in the wound-gum regions, but is unable to survive, probably owing to insufficient moisture; *Cytospora*, however, lives on from year to year in wood impregnated with wound gum. The wound-gum region in a wound infected with *Cytospora* was usually much more extensive than in an uninfected wound. Some evidence was obtained that *Cytospora* and *Sclerotinia* secrete a toxin which kills peach wood and promotes the formation of wound gum. The presence of wound gum in peach wood may retard but does not prevent the rate of invasion by *Cytospora*; it appears, however, to arrest the progress of *Sclerotinia*.

A bibliography of 43 titles is appended.

Joëssel (P. H.) & Bordas (J.). **Recherches sur les dépérissements de l'Abricotier dans la vallée du Rhône (1927 à 1930).**—[Researches into Apricot die-back in the Rhone Valley (1927 to 1930).]—*Ann. des Épiphyties*, xviii, 5, pp. 325–359, 7 pl., 5 figs., 1 map, 1931. [Received August, 1932.]

In this fully documented account of the different forms of die-back to which apricots in the Rhone valley are susceptible [*R.A.M.*, xi, pp. 23, 187], the authors state that the root rot caused by *Armillaria mellea* apparently bears no relation to progressive reduction in the lime content of the soil, being present, for instance, in an orchard where the soil contained 55·3 per cent. of carbonate of lime. This observation is in direct contrast with that reported by Gard on walnut root rot caused by the same fungus [ibid., vii, p. 686]. *Monilia* [*Sclerotinia cinerea*; ibid., viii, p. 581] may, by weakening the trees, indirectly induce die-back, the dead parts serving as the starting points of necroses caused by other fungi which spread to fresh areas of the wood. As regards apoplexy [ibid., v, p. 304; ix, p. 256; x, p. 529], the cause of which has not yet definitely been ascertained, the authors state that no one symptom can be regarded as diagnostic of this condition, brown discolorations of the phloem, regarded by Chabrolin as specific, being found in other trees affected by other diseases, as well as in apricots affected by root rot or insect attack.

A large number of the cases of apricot die-back appear to be associated with brown patches in the wood originating, as a rule, in dead parts carelessly left on the tree or in injuries sustained in the nursery or during pruning operations, &c. These necrosed

areas may be present in perfectly healthy trees; die-back and death ensue when they spread to an important part of the vascular system, this spread preceding, at least very frequently, any discoloration of the phloem. While *Verticillium dahliae* [ibid., ix, p. 256; xi, pp. 23, 550] is apparently, particularly active in producing this brown discoloration, other organisms have been proved equally capable of causing similar lesions. Verticilliosis is, in the authors' opinion, only one of the causes of die-back.

The view that the many different forms of apricot die-back all originate from lesions in the wood accords, on the one hand, with the morbid symptoms (probably due to reduced circulation of sap) shown by the trees and, in the other, with the spread of die-back throughout the Rhone valley. The high mortality is due to insufficient care and not, in all probability, to the presence of a new parasite.

A bibliography of 50 titles is appended.

HARRIS (J. B.). **Die back of Apricot trees in the Barossa district.**—*Journ. Dept. Agric. S. Australia*, xxxv, 12, pp. 1394–1395, 1932.

This is a brief compilation of notes from the relevant literature which, in the author's opinion, may have a bearing on a die-back of apricot trees accompanied by a copious exudation of gum, which of recent years has come into prominence in the Barossa district of South Australia, and the real causes of which have not yet been established.

WAHL (H. A.). **The migration of Bacillus amylovorus in the tissue of the Quince.**—*Journ. Agric. Res.*, xlv, 1, pp. 59–64, 2 pl., 1932.

As shown by the author's investigations [details of which are given], carried out at the Pennsylvania State College, the migration after inoculation of the fireblight organism (*Bacillus amylovorus*) in quince tissues proceeds on the same lines as described by Nixon for the apple [*R.A.M.*, viii, p. 249], and by F. P. Gibbons (unpublished thesis, Pennsylvania State College) for the pear. In all essentials it is also similar to that of *Bacterium tumefaciens* in the tomato [ibid., vii, p. 767], *Bact. tabacum* in tobacco [ibid., viii, p. 408], and *Bact. vignae* in Lima beans [ibid., viii, p. 220]. In the quince, during the first 42 hours from inoculation the organism travelled intercellularly in a narrow cylindrical area in the inner cortex, extending around the stem about 10 cells inward from the epidermis, with the production of schizogenous cavities. Intracellular invasion of the cortex, involving the formation of lysigenous cavities, occurred about 96 hours after inoculation, and death of all the stem tissues took place within 100 hours after this. Within this period, however, the organism could not be seen outside the cortical tissues, though Rosen [ibid., ix, p. 189] has reported invasion of the phloem and cambium in the apple.

ZELLER (S. M.) & VAUGHAN (E. K.). **Crinkle disease of Strawberry.**—*Phytopath.*, xxii, 8, pp. 709–713, 1 fig., 1932.

Crinkle disease of strawberry, which was first observed by

C. E. Schuster and the senior writer in 1925 [*R.A.M.*, viii, p. 295], is stated to be widespread in the Marshall variety in the Pacific Northwest. Other varieties showing the symptoms include Corvallis, Dunlap, Gene, Sear's La Grange, Magoon, Missionary, Nick Ohmer, Norwood, O.S.C. No. 7, Howard 17 (Premier), Redheart (U.S.D.A. No. 632), and U.S.D.A. Nos. 227–A, 400, 520, and 682.

In general appearance and behaviour crinkle belongs to the virus type of disease, closely resembling that described as yellows (xanthosis) from California [ibid., ix, p. 193] which is not believed to occur in Oregon. The two most striking symptoms of the former disease are crinkling and chlorosis of the foliage. The centres of the yellowed spots often become necrotic, reddened at first and then brownish. The chlorosis is generally most pronounced near the margins, but the yellowing may extend in streaks along a few of the veins towards the midrib: most of the veins, however, become 'cleared'. The more or less regular dentation of the normal leaflets is replaced by deeper crenation and a wavy lobing of the margins.

In all cases where the parent plants were healthy the runners remained so, whereas all those from crinkled parents developed the symptoms of the disease sooner or later. Temporary recovery is a noticeable feature of crinkle in certain soils. In plantings less than a year old the disease cannot be recognized with certainty, while in older stocks the parents and most of the runners show the typical symptoms. Where autumn roguing is necessary, therefore, planting in the previous autumn is advisable. Considerable circumstantial evidence [which is briefly adduced] is available in support of the theory that strawberry crinkle is transmitted under field conditions. The practicability of selection and roguing to eliminate crinkle from the Marshall variety has been demonstrated, the former process being adapted to fields containing 10 to 20 per cent. infection and the latter to those with under 5 per cent.

Doidge (E[thel] M.). **'Black spot' of Mangoes.**—*Farming in South Africa*, vii, 75, pp. 89–91, 5 figs., 1932.

The condition commonly known as 'black spot' of mango in South Africa may be due either to *Gloeosporium mangiferae*, sometimes regarded as identical with *Colletotrichum gloeosporioides* [*R.A.M.*, vii, p. 305], or to *Bacillus mangiferae* Doidge (*Ann. Appl. Biol.*, ii, [p. 1], 1915), which is apparently unknown in any other country [cf. *R.A.M.*, xi, p. 698].

Though superficially similar, the symptoms caused by the two organisms may readily be distinguished. *G. mangiferae* produces small, black spots on the open flower panicle, involving the death of groups of flowers and sometimes preventing the setting of the fruit. The spots on the young leaves are dark, circular or angular, and often fall out, giving a shot hole appearance to the foliage. The fruit may be attacked, with the formation of black sunken spots, at any stage of development from the age of a week or two onwards; at this stage extensive dropping occurs. *G. mangiferae*

is further believed to be responsible for 'tear staining' and russeting of the skin.

B. mangiferae produces on the young leaves dark brown or black, slightly raised spots, larger and more definitely angular than those of the anthracnose fungus. Discoloured areas are formed on the stems, which further develop cracks that exude gum. Attacks on the flower stalks result in a heavy fall of flowers and young fruit. The first symptom of infection on young fruits is a small, dark green, water soaked spot, which spreads, darkens, becomes raised, and may also crack and exude gum. Diseased fruits fall from the tree at the slightest current of air and the ground is strewn with decaying material, while those reaching maturity are unsaleable.

Most of the South African varieties are susceptible to *B. mangiferae*, especially the small yellow mango, but some degree of resistance has been shown by the peach type. In addition to the removal of infective material, the growth of a cover crop may serve to reduce the amount of bacterial disease, but no definite system of control can yet be recommended.

King (N. J.). **Squirter in Bananas. Causes investigated.**—*Queensland Agric. Journ.*, xxxviii, 1, pp. 30–42, 1932.

Field observations in Queensland indicated that squirter disease of bananas [*R.A.M.*, viii, p. 513] is not associated with soil conditions as revealed by chemical analysis, but results from the exposure of ripening fruit to cold weather in the plantation. By arresting certain physiological processes associated with ripening, this exposure renders the fruit subject to complete physiological breakdown during transport. Possibly, a further development of the breakdown process in the tissues is then caused by the sudden and very considerable fluctuations in temperature which occur during transit to the southern markets at certain times of the year, or by contamination at this stage by an organism. In a letter written in 1925, the manager of the Committee of Direction of Fruit Marketing stated that fruit being loaded on to the trains or already in transit during the severe frosts experienced in July reached the southern markets in good condition, whereas other bananas dispatched a week later were very severely attacked. So far, it appears that fruit from North Queensland is not liable to develop the trouble.

If squirter develops in exposed, low-lying parts of a plantation, and is favoured by frosts and the settling of cold air, the only adequate preventive is to eliminate such areas and use more sheltered land. During the very mild winter experienced in south-eastern Queensland in 1931, squirter was less prevalent than it had been for many years.

Ikata (S.). **Studies on 'kurobosi' (black star)-disease of Diospyros kaki.**—*Rept. Okayamaken Agric. Exper. Stat.*, 37, 48 pp., 7 pl., 1932. (Japanese.) [Abs. in *Japanese Journ. of Botany*, vi, 2, p. (34), 1932.]

Heavy damage is caused on young and mature persimmon (*Diospyros kaki*) plants in Japan by *Fusicladium levieri* Magn.,

with which *F. diospyrae* Hori et Yoshino is regarded as synonymous. Conidia are produced on various standard media and germinate seven to ten days after inoculation on leaves. Under field conditions the mycelium overwinters in the lesions on the branches, and in April new conidiophores are produced. Infection takes place through the cuticle, the fungus penetrating the contact lines of two adjacent epidermal cells, dissolving the middle lamella, and entering the subepidermal intercellular spaces where vesicles are formed from which hyphae extend along the intercellular spaces. These hyphae ultimately destroy the cells without actually entering them.

Ikata (S.). **Supplement to 'Studies on leaf-fall disease of Diospyros kaki'. I.**—*Rept. Okayamaken Agric. Exper. Stat.*, 37, 19 pp., 5 pl., 1932. (Japanese.) [Abs. in *Japanese Journ. of Botany*, vi, 2, p. (34), 1932.]

Successful inoculation experiments were carried out with *Cercospora kaki*, the causal organism of angular leaf fall of the persimmon (*Diospyros kaki*) in Japan [cf. *R.A.M.*, viii, p. 453]. The incubation periods for inoculation by means of the conidia and mycelium were 29 to 30 and 29 to 31 days, respectively. Entry into the leaf is effected by short secondary or tertiary branches from the germ-tube penetrating the stomata. Cuticular penetration was not observed. The infection tube produced by the short branches enters the sub-stomatal air cavity and forms vesicular swellings from which a number of infection hyphae emerge.

Rivalier (E.) & Seydel (S.). **Cultures minces sur lames gélosées, colorées et examinées in situ en préparations définitives, pour étude des cryptogames microscopiques.** [Thin cultures on slides dipped in agar, stained and examined *in situ* in fixed preparations, for the study of microscopic fungi.] —*Comptes rendus Soc. de Biol.*, cx, 18, pp. 181–184, 1932.

The writers have found the following technique useful in the study of microscopic fungi. Slides are sterilized in Petri dishes or Borrel tubes (preferably the former) by dry heat, dipped in a weak agar medium (2 gm. peptone, 4 gm. glucose, and 1·5 gm. agar per 200 c.c. water), replaced in the dishes or tubes in 2 or 3 c.c. sterilized water, and sown with pure cultures. At the desired stage of growth the cultures are fixed either by osmic or formaldehyde fumes or simply by desiccation at 37° C. for 24 hours, the slides being then totally immersed in a solution of 1 part collodion to 2 parts each of absolute alcohol and ether, dried for several hours at 37°, stained with cotton blue in lactophenol, and mounted (after washing in alcohol at 70°, dehydrating in alcohol at 90° for two minutes, then in anhydrous acetone, toluene, or xylol) in Canada balsam or Dammar resin.

Cook (W. R. I.). **On the occurrence of amoebae in plant tissue.** —*Ann. de Protistologie*, iii, 4 pp. 197–200, 6 figs., 1932.

In the epidermal and cortical cells of the young roots of *Apium nodiflorum* the author observed amoebae [which are described and figured] which divided up into five or six cysts, several small

amoebae ultimately emerging from each and either forming fresh cysts within the plant or migrating to the exterior. No further stages in the life-history were found, and the evidence obtained indicated that the amoeba migrated into the soil as a free-living species. The organism produced no recognizable effect on the host, which showed no pathological changes as a result of its presence even when, as sometimes occurred in the autumn, the majority of the peripheral cells were infected. The cells appeared to suffer no injury and behaved normally both while occupied by the cysts and after the liberated amoebae had left them. The amoebae were in no way connected with stages in the life-history of any species of the Plasmodiophoraceae; the author considers that the organisms reported by Jones [*R.A.M.*, v, p. 686] as producing mosaic-like symptoms in tobacco leaves and which the latter suggested might be a stage of a species of *Plasmodiophora* were, more probably, a species of encysted amoebae which had temporarily entered the leaf and passed through cell walls weakened by the action of the mosaic-producing agency.

Köhler (E.). **Allgemeines über Viruskrankheiten bei Pflanzen.** [General information on virus diseases of plants.]—*Angew. Bot.*, xiv, 4, pp. 334–348, 1932.

This is a survey in general terms of the present status of information concerning the virus diseases of plants, discussed under various aspects, such as the nature of the infective principal and its effects on the plant, modes of infection, properties of the viruses, and epidemiology.

Dufrénoy (J.). **Die Viruskrankheiten.** [The virus diseases.]—*Phytopath. Zeitschr.*, v, 1, pp. 85–90, 6 figs., 1932.

By means of Borrel's super-coloration technique (*Bull. de Dermatol.*, 9, 1930), the writer detected in the epidermal cells of mosaic tobacco plants bodies analogous to those found by the former worker in the tissues of animals suffering from virus diseases. After immersion in Meves's fluid, eight days' fixation, six hours' steeping in iron tannate, and staining with Ziel's carbol-fuchsin, the cytoplasm showed pink or red spots occupied by numerous minute, sharply defined, homogeneous granules, which were not found in the normal green cells.

The epidermis of *Iris tingitana* was found especially suitable for the study of the effect of mosaic on the chondriome. On fixation with Nemec's compound (formol, potassium bichromate, and chromic acid) and staining with acid fuchsin, the epidermal cells of mosaic leaves [*R.A.M.*, vii, p. 784; x, p. 162] were found to contain mitochondria in a state of active division into granules, while the vacuome simultaneously broke up into a number of vacuoles. At a more advanced stage of infection the mitochondria occur in groups surrounding an aggregation of small vacuoles. The cytoplasm in which the groups of mitochondria occur stains more and more deeply, so that eventually the latter cannot be distinguished. These areas form the so-called 'cell inclusions' or 'X-bodies' of various authors [cf. ibid., xi, p. 21].

Two forms of tulip breaking [ibid., xi, pp. 591, 718] may be dis-

tinguished, namely, 'clear breaking' of red tulips, caused by a deficiency of anthocyanin in the vacuoles, and 'self breaking', characterized by an intensification of the normal anthocyanin pigment to dark red.

FUKUSHI (T.). **A contribution to our knowledge of virus diseases of plants in Japan.**—*Trans. Sapporo Nat. Hist. Soc.*, xii, 2–3, pp. 130–141, 1932.

After a general historical discussion on the virus diseases of plants, a list is given of those hitherto recorded in Japan (with the locality and brief literature references), arranged in tabular form according to the families of the hosts. It includes 71 species of plants in 51 genera distributed among 15 families, those newly reported to be affected by mosaic including *Primula obconica* and *P. denticulata*, *Crotalaria juncea* [cf. *R.A.M.*, x, p. 809], carnation, *Iris pumila* and *I. tectorum* [ibid., x, p. 162], and various species of lily.

CHAUDHURI (H.). **Recherches sur la bactérie des nodosités radiculaires du Casuarina equisetifolia.** [Researches on the bacterium of the root nodules of *Casuarina equisetifolia*.]—*Bull. Soc. Bot. de France*, lxxviii, 7–8, pp. 447–452, 2 figs., 1931.

Rod-shaped bacteria, capable of nitrofixation and resembling those occurring in the root nodules of the Leguminosae, were isolated from the coralloid masses found on the roots of *Casuarina equisetifolia* in the sand dunes of Madras [*R.A.M.*, iii, p. 225]. Inoculation experiments on *C. equisetifolia* with bacteria from *Medicago*, *Melilotus*, and *Lathyrus* nodules gave negative results, but four out of 20 potted *C. equisetifolia* plants in sterilized soil developed nodules when inoculated with the crushed nodules from the same host, six non-inoculated controls remaining free. The root nodules appear to be necessary to the development of *C. equisetifolia* only in the sandy soils along the coast where nitrogen is deficient, being absent from the same host in the Punjab and United Provinces [but see next abstract].

PARKER (R. N.). **Casuarina root-nodules.**—*Indian Forester*, lviii, 7, pp. 362–364, 1932.

Contrary to Chaudhuri's statement that root nodules are absent from *Casuarina equisetifolia* in the Punjab and United Provinces in India [see preceding abstract], the writer has found them by thorough and careful inspection on this and other species of *Casuarina* at Dehra Dun (United Provinces). He is, moreover, convinced from observations and experiments that the presence of the nodules is essential to the satisfactory growth of the trees, a marked improvement in the condition of which has been obtained in several cases by the addition of sand in which *C. equisetifolia* bearing nodules had grown, to the soil around the roots.

CARBONE (D.) & KALAJEV (A.). **Ricerche sulle vaccinazione delle piante.** [Researches on the vaccination of plants.]—*Phytopath. Zeitschr.*, v, 1, pp. 85–97, 1932. [German summary.]

Continuing the studies of the first-named writer and Jarach on the artificial immunization of beans [*Phaseolus vulgaris*] against *Botrytis cinerea* [*R.A.M.*, xi, p. 593], it was shown that the immunizing capacity of the fungus extracts varies according to mode of preparation and does not strictly correspond to their toxicity. This invalidates the suggestion that the intensified resistance of the inoculated plants is only an accompaniment of recovery from the disease.

In this connexion it was further shown that plants subjected to various forms of maltreatment, e.g., germination in the presence of sulphuric acid, caffein, or benzoate or salicylate of potassium, or scalding the roots in hot water, were not more resistant than the controls to infection by *B. cinerea*, but on the contrary more susceptible.

In all the plants in both series of tests the fungus develops in the early stages, and only in the preinoculated individuals does the mycelium subsequently disappear and the wound heal. These data support the assumption that vaccinal immunity in plants is a vital, specific phenomenon.

LINK (G. K. K.), LINK (ADELINE de S.), CROSS (G. L.), & WILCOX (HAZEL). **The precipitin-ring test applied to fungi.**—*Proc. Soc. Exper. Biol. & Med.*, xxix, 9, pp. 1278–1281, 1932.

For several years the writers have been engaged on a study of the possible applications of serological technique to various phytopathogenic fungi and their non-pathogenic taxonomic allies. The work was begun with two species of *Fusarium*, viz., *F. conglutinans*, the agent of cabbage yellows, and *F. cubense* [*F. oxysporum*: *R.A.M.*, xi, pp. 306, 624], the causal organism of banana wilt, and extended to a number of other species of *Fusarium* as well as *Ramularia* sp., *Cylindrocarpon album*, *Sclerotinia sclerotiorum*, and *Neurospora tetrasperma* (+ and − strains).

Richards's solution proved a suitable medium for all the fungi tested, good mats usually developing after three to four weeks at 20° to 30° C. A method has been devised for recovering the mats, drying them with a minimum of autolysis, and rapidly preparing fungus powders passing a 100-mesh sieve. Intravenous injection of the clear saline extracts of the powders and intraperitoneal injection of saline resuspensions of the extracted residues were shown by experiments on rabbits to give positive results. Clear, potent test antigens were obtained by grinding the powders with ligroin-extracted pumice, followed by extraction with petrol ether and then with saline for 18 hours at 0°, and finally by centrifugation and filtration through coarse filter paper. Tests of the relative efficacy of undiluted sera and of those diluted with glycerine, glucose, and hypertonic salt solution showed that the former were more effective against progressive dilutions of the test antigens. All the fungi tested were found to be antigenic by the precipitin-ring method, titres up to 1 : 25,600 having been obtained. All but one of the 120 animals used in the experiments produced antisera.

Fischer (R.). **Über den Einfluss des jährlichen Witterungsverlaufes auf die Frequenz von Pflanzenkrankheiten.** [On the influence of the annual course of the weather on the incidence of plant diseases.]—*Phytopath. Zeitschr.*, v, 1, pp. 55–74, 7 graphs, 1932.

Particulars are given of the writer's attempts to establish a correlation between the incidence of parasitic and non-parasitic plant diseases in Austria and deviations from the normal monthly temperature and precipitation means from 1927 to 1931. On the average of the five-year period the parasitic frequency curve reached its apex in August and the non-parasitic in June.

A connexion was observed between the rainfall and the occurrence of bacterial diseases and *Botrytis cinerea*, which were most prevalent in the wet late summers of 1930 and 1931. *Gymnosporangium sabinae* was widespread in 1928, presumably in consequence of the cool, damp weather in May which favoured infection. *Exoascus* [*Taphrina*] *deformans* was abundant on peaches in 1927 after a mild winter and early spring, whereas in 1929, following an abnormally cold corresponding period, it was practically absent. In general, infection by the Erysiphaceae reaches a climax in May or June. Apple and pear scab (*Venturia inaequalis* and *V. pirina*) were specially prevalent in 1928, when very damp conditions obtained. Mention must be made of the numerous specimens of *Ophiobolus* [*graminis* and *O. herpotrichus*] from cereals sent in during the warm, damp weather at the end of June and beginning of July, 1927 [*R.A.M.*, vii, p. 87; ix, p. 586]. Leaf-spotting fungi of the genera *Stigmatea*, *Mycosphaerella*, *Phyllosticta*, *Ascochyta*, *Septoria*, *Cercospora*, and others uniformly attain their maximum virulence in August, when showery weather (as in 1931) is liable to prevail.

Schaffnit (E.). **Aus unserer Versuchstätigkeit mit Wein-, Obst- und Gartengewächsen.** [Notes on our experimental work with vineyard, orchard, and garden plants.]—*Mitt. Deutsch. Landw.-Gesellsch.*, xlvii, 25, pp. 471–472; 26, pp. 487–489, 3 figs., 1 graph, 1932.

A summary is given of the writer's investigations, covering a period of ten years at the Bonn Institute for Plant Diseases, on the relations between the nutrition of plants and their susceptibility to fungous infection [*R.A.M.*, ix, p. 472]. Perhaps the main outcome of the experiments was to show that with various well-known parasites, e.g., true and downy mildew of the vine (*Uncinula necator* and *Plasmopara* [*viticola*]), American gooseberry mildew (*Sphaerotheca mors-uvae*), rose mildew [*S. pannosa*], apple mildew (*Podosphaera leucotricha*), leaf fall of currants [*Pseudopeziza ribis*], and shot hole of peach and cherry [*Clasterosporium carpophilum*], infection is promoted by an excess of nitrogen and a shortage of potash [cf. ibid., xi, p. 704]. The incidence of disease was lowest among plants deficient both in nitrogen and phosphoric acid.

Satoh (S.). **Über die Verarbeitung der Zellulose durch einige krankheitserregende Pilze.** [On the transformation of cellu-

lose by some disease-producing fungi.]—*Forsch. aus dem Geb. der Pflanzenkrankh.*, [Kyoto], i, pp. 13–20, 4 figs., 1931. (Japanese summary.) [Abs. in *Japanese Journ. of Botany*, vi, 2, p. (49), 1932.]

The cellulose-dissolving action of the following fungi was confirmed: *Piricularia oryzae*, *Ophiobolus miyabeanus* [*R.A.M.*, xi, p. 536], *Helminthosporium* sp., *Fusarium* sp. (two cultural strains), *Gibberella saubinetii*, and *Rhizoctonia papayae*.

VERPLANCKE (G.). **Étude comparative de Pommes de terre d'origines diverses. I. Résultats des expériences faites en 1931.** [A comparative study of Potatoes of various origins. I. Results of experiments made in 1931.]—*Bull. Inst. Agron. et des Stat. de Recherches Gembloux*, i, 2, pp. 123–145, 1932. [Flemish, German, and English summaries.]

Preliminary notes are given of tests in various parts of Belgium of potato tubers of the Industrie variety grown in Holland and in the Belgian Ardennes, with special reference to the prevalence in them of virus diseases.

Prisopgave om Anvisning til Bekæmpelse af Kartoflens Rodfiltsvamp (Hypochnus solani) og Kartoflens Bladrullesyge. [A prize thesis on directions for the control of violet root rot of Potato (*Hypochnus solani*) and leaf roll disease of Potato.]—*Tidsskr. for Planteavl*, xxxviii, 3, pp. 535–536, 1932.

Full particulars are given of the conditions to be observed by candidates competing for a prize of Kr. 5,000 offered by the Danish Agricultural Economy Society, Copenhagen, at the instigation of the Danish Spirit Factories, Ltd., for a thesis on the control of violet root rot ('rodfiltsvamp') (*Hypochnus* [*Corticium*] *solani*) and leaf roll of potato. Theses must be received before the end of 1937.

ABE (T.). **On the effect of sunlight on the infection of the Rice plant by Piricularia oryzae.**—*Forsch. aus dem Geb. der Pflanzenkrankh.*, [Kyoto], i, pp. 46–53, 1931. (Japanese.) [German abs. in *Japanese Journ. of Botany*, vi, 2, p. (27), 1932.]

Rice seedlings moistened with water containing spores of *Piricularia oryzae* [*R.A.M.*, xi, p. 538] were kept for eight to twelve hours in light or dark frames under otherwise identical conditions. Infection was found to be more intense on the seedlings kept in darkness, so that light evidently inhibits the development of the fungus to some extent.

ABE (T.) & OKAMURA (E.). **On the effect of copper sulphate upon the susceptibility of the Rice plant to the blast disease.**—*Forsch. aus dem Geb. der Pflanzenkrankh.*, [Kyoto], i, pp. 54–70, 1931. (Japanese.) [Abs. in *Japanese Journ. of Botany*, vi, 2, p. (27), 1932.]

The effect of copper sulphate applied through the roots on the susceptibility of rice (seedlings and adult plants) to blast (*Piricularia oryzae*) [see preceding abstract] was studied in soil and water

cultures. Susceptibility was found to be inversely proportional to the quantity of copper sulphate given. For instance, in young plants, taking the number of disease spots per 100 mm. leaf length as a measure, it is 1,793, 2,262, or 2,925 for $\frac{1}{500,000}$, $\frac{1}{1,000,000}$, or 0 copper sulphate, respectively. Similar ratios were observed in older plants. The development of the plants was inversely proportional to the quantity of copper sulphate used.

HIRAYAMA (S.). **On the influence of osmotic pressure of culture media on the mycelial growth of Piricularia oryzae B. et C.**—*Forsch. aus dem Geb. der Pflanzenkrankh.*, [Kyoto], i, pp. 27–32, 2 figs., 1931. (Japanese, with English summary.) [Abs. in *Japanese Journ. of Botany*, vi, 2, p. (33), 1932.]

Varying quantities of glucose or glycerine were added to potato decoction agar cultures of *Piricularia oryzae* [see preceding abstracts] to make solutions of different osmotic pressure. Mycelial growth was observed to be most vigorous in the media of higher osmotic pressure.

ENDO (S.). **Studies on the Sclerotium diseases of the Rice plant. IV. On the morphology of certain important fungi causing Sclerotium diseases of the Rice plant.**—*Forsch. aus dem Geb. der Pflanzenkrankh.*, [Kyoto], i, pp. 126–148, 1 pl., 1931. [Abs. in *Japanese Journ. of Botany*, vi, 2, p. (28), 1932.]

Seven fungi are enumerated as agents of sclerotial diseases of rice in Japan, with morphological descriptions, namely, *Hypochnus* [*Corticium*] *sasakii*, *Sclerotium oryzae-sativae*, three other species of *Sclerotium*, *Entostroma oryzae* (*S. phyllachoroides*), and *H. centrifugus* [*C. centrifugum*: *R.A.M.*, xi, p. 539].

ENDO (S.). **Studies on the Sclerotium diseases of the Rice plant. V. Ability of overwintering of certain important fungi causing Sclerotium diseases of the Rice plant and their resistance to dry conditions.**—*Forsch. aus dem Geb. der Pflanzenkrankh.*, [Kyoto], i, pp. 149–167, 1931. (Japanese, with English summary.) [Abs. in *Japanese Journ. of Botany*, vi, 2, p. (28), 1932.]

Most of the causal organisms of sclerotial diseases of rice [see preceding abstract] are stated to be capable of overwintering in the soil, either in sclerotial or mycelial form. The sclerotia of some of these fungi kept their viability for 21 months in a desiccator, while others were able to develop profusely after nine months in dry soil [cf. *R.A.M.*, xi, p. 600].

MURRAY (R. K. S.). **Mycologist's report for 1931.**—*Tenth Ann. Rept. Rubber Res. Scheme (Ceylon), 1932*, pp. 14–18, 1932.

During 1931, in the course of the sulphur dusting experiments for the control of rubber mildew (*Oidium heveae*) [*R.A.M.*, xi, pp. 126, 401] in Ceylon, an improved model of the 'Dustejecta' dusting machine manufactured by Messrs. Drake and Fletcher, Ltd., Maidstone, England, was tested, a full report being submitted to the manufacturers and the Ceylon agents.

Laboratory tests of the particle size of proprietary brands of dusting sulphurs showed that 'flotate' sulphur from the Kawah Poetih volcanic deposits in Java [ibid., x, p. 749] was the finest of the tested products but had the drawback that the particles tended to become agglomerated as a result of the hygroscopic nature of the powder, which was ascertained to result from the presence of free acid. The proportion of acid present was determined and it was then removed by neutralizing while wet with sodium carbonate. The powder so produced was perfectly free-flowing and physically ideal for dusting but the method of preparation is unsuitable for use on a field scale. It was found, however, that by mixing freshly burned lime with the 'flotate' sulphur in the proportion of 1 to 10 the lime slaked itself with the moisture, so that a dry, free-flowing powder was obtained.

Evidence was obtained that small quantities of sulphuretted hydrogen were emitted by the action of sulphur on the mycelium and spores of *O. heveae*, from which it is concluded that the gas may play an important part in the fungicidal action of sulphur [cf. ibid., xi, p. 731].

A field experiment was conducted during the south-west monsoon season to test the value in the control of bark rot of *Hevea* rubber [*Phytophthora* spp.: ibid., ix, p. 673; x, p. 79] of a series of special tar emulsions prepared by the South Metropolitan Gas Company, London. These emulsions had the advantage that they could be applied as liquids to dry or moist tapping cuts, drying after a few minutes to form a firm, waterproof film. Three emulsions containing, respectively, 2 per cent., 1 per cent., and no tar acids as the disinfectant principle, were found to give as satisfactory control as the greasy mixture 'brunol', but they were insufficiently stabilized to permit of being stored for any length of time in a tropical climate.

O'Brien (T. E. H.). **Chemist and Chief Technical Officer's report for 1931.**—*Tenth Ann. Rept. Rubber Res. Scheme (Ceylon), 1932*, pp. 11–14, 1932.

Further experiments at the Imperial Institute, London, have confirmed the view previously expressed by the author that the addition of paranitrophenol as a disinfectant to unsmoked sheet rubber leads to unsatisfactory keeping qualities [*R.A.M.*, x, p. 686]. Sheet rubber air-dried at 100° F. has better ageing properties than smoked sheet prepared from the same latex, but air-dried sheet containing paranitrophenol was markedly inferior. Tests are to be conducted with salicylanilide [ibid., xi, p. 679] as a mould preventative for unsmoked sheet rubber.

Verplancke (G.). **L'examen microbiologique du sol.** [The microbiological examination of the soil.]—*Bull. Inst. Agron. et des Stat. de Recherches Gembloux*, i, 1, pp. 35–45, 3 pl. (1 col.), 1932. [Flemish, German, and English summaries.]

A study was made of the various methods used in soil bacteriology, especially that of direct microscopic examination. Cholodny's method (*Arch. für Microbiol.*, i, p. 620, 1930) proved very satisfactory for the determination of the effects of a special

fertilizer on the soil flora of an experimental farm at Gembloux, Belgium. The addition to the soil of potassium, phosphorus, and nitrogen resulted in an increase in the number of fungi per gm. from 44,000 to 187,500. The addition of peptone and urea (1 per cent.) increased the number of fungi from 25,000 to 28,000 and 33,000 per gm. of soil, respectively, while mannite caused a decline to 6,000.

THOM (C.) & HUMFELD (H.). **Notes on the association of micro-organisms and roots.**—*Soil Sci.*, xxxiv, 1, pp. 29–36, 1932.

The writers confirmed the work of previous observers as to the greater prevalence of micro-organisms in the soil in the immediate vicinity of plant roots than elsewhere. Counts were made from the soil around the dug-up roots that could be dislodged by vigorous shaking and also from fibrous roots with the soil adhering to them after shaking. The former gave higher numbers than soil not around roots and the numbers were very greatly increased (sometimes by more than 10 times) when the roots with adhering soil were examined, especially when the roots were rotted by the action of root-rotting fungi. Mould cultures from maize roots in acid soil produced colonies predominantly of *Trichoderma*, while those from alkaline soils yielded chiefly *Penicillium luteum* [*R.A.M.*, ix, p. 799] and allied species of the biverticillate series [ibid., xi, p. 264]. High colony counts of fungi occurred on the very acid and strongly alkaline samples. The inference from these data is that maize roots, penetrating through soil masses of strongly acid or alkaline reaction, still maintain their own reaction between P_H 6 and 7·5, a zone favourable to mould activity.

WEBER (G. F.). **Diseases of Peppers in Florida.**—*Florida Agric. Exper. Stat. Bull.* 244, 46 pp., 38 figs., 1932.

Popular and copiously illustrated notes are given on the symptoms, causes, and control of the following chilli pepper [*Capsicum annuum*] diseases in Florida, where the annual losses from parasitic and physiological disorders are estimated at 15 per cent. of the crop: bacterial spot (*Bacterium vesicatorium*) [*R.A.M.*, ix, p. 580], southern blight (*Sclerotium rolfsii*), *Cercospora* leaf spot or 'frog-eye' (*C. capsici*), anthracnose (*Glomerella cingulata*) the imperfect stages of which are *Gloeosporium piperatum* and *Colletotrichum nigrum*, early blight (*Alternaria solani*), *Phytophthora* blight (*P. capsici*) [ibid., ii, p. 101; x, p. 755], recently detected, and previously apparently reported only from New Mexico and Porto Rico; 'pink joint' (*Sclerotinia sclerotiorum*), bacterial soft rot (*Bacillus aroideae* and *B. carotovorus*), mosaic [ibid., x, p. 809], damping-off (*Rhizoctonia* [*Corticium*] *solani* and *Bact. vesicatorium*), blossom-end rot and blossom blight, the former associated with unbalanced water relations and secondary fungous infections and the latter caused by *Choanephora cucurbitarum* [ibid., ix, p. 205], *Phoma* rot (*P. destructiva*) [ibid., ix, p. 765], soil rot (*Corticium solani*), *Helminthosporium* pod rot (*H. curvulum*) [ibid., v, p. 294], and a pot rot due to an undetermined species of *Cercospora*, differing from *C. capsici*.

ERWIN (A. T.). **The Peppers.**—*Iowa Agric. Exper. Stat. Bull.* 293, pp. 119–152, 10 figs., 2 graphs, 1932.

In connexion with a study of the botany, varietal classification, and cultivation of chilli peppers the author accepts the view that all the cultivated forms belong to a single species, for which the name *Capsicum frutescens* is preferred to *C. annuum*. Brief notes are given on the following diseases of this crop observed on the Iowa Agricultural Experiment Station collection [cf. preceding abstract]: black spot due to a large-spored species of *Alternaria* often associated with sun scald or blossom-end rot, prevalent in 1931 on the Bull Nose varieties; damping-off (probably *Corticium vagum* [*C. solani*], *Sclerotinia sclerotiorum*, and *Pythium de Baryanum*); sclerotial blight (*Sclerotium rolfsii*); mosaic; bud rot (*Mucor* sp.); leaf spot (*Cercospora capsici*); bacterial spot (*Bacterium vesicatorium*); and anthracnose (probably *Vermicularia* [*Colletotrichum*] *capsici*) [*R.A.M.*, x, p. 57; xi, p. 545].

KUNTZ (P. R.). **El mosaico en las nuevas variedades de Caña de Azúcar P.R. 803, P.R. 807, F.C. 916 y S.C. 12(4).** [Mosaic in the new Sugar-Cane varieties P.R. 803, P.R. 807, F.C. 916, and S.C. 12(4).]—*Puerto Rico Estac. Exper. Insul. Circ.* 96, 6 pp., 2 figs., 1932.

An inspection of plots of the newly developed sugar-cane varieties, P.R. 803, P.R. 807, and F.C. 916 in a district of Porto Rico liable to severe mosaic infection showed a low incidence of disease (0·33, 0, and 4 per cent. respectively, compared with 14·66 per cent. in S.C. 12/4). The varieties in question are more prolific yielders than B.H. 10(12) and are considered to be worthy of further trials on a commercial scale.

Report on the work of the Department of Science and Agriculture for the year ending June 30th, 1932.—*Agric. Journ.*, Barbados, i, 2, pp. 1–30, 3 maps, 1932.

In the section of this report dealing with gumming disease of sugar-cane [*Bacterium vascularum*: *R.A.M.*, x, p. 127; xi, p. 75] two maps are given showing the distribution of the disease in Barbados in 1929–30 and 1931. The disease has spread rapidly. To assist in controlling it, B. 891, B. 755, and B.H. 10(12) canes were distributed in the areas proclaimed to be infected under the Mosaic Disease Eradication Act [ibid., viii, p. 815].

B. 891, as well as B. 726 and Ba. 11569, may occasionally develop stem symptoms, though in the latter variety the gumming is not sufficient as yet to cause trouble in the factory. The possibility that Ba. 11569 may eventually become badly attacked with the stem form of the disease is especially unfortunate as this cane has proved of great value in certain parts of the island.

GILMAN (J. C.). **First supplementary list of parasitic fungi from Iowa.**—*Iowa State Coll. Journ. of Sci.*, vi, 4, pp. 357–365, 1932.

Since the publication in 1929 of the previous list of parasitic fungi occurring in Iowa [*R.A.M.*, ix, p. 65], 35 fungi hitherto unre-

corded in the State have been collected and 26 new hosts added. The parasitic fungi known in Iowa now comprise 995 species on 1,035 host plants.

STOREY (H. H.) & LEACH (R.). **Tea yellows disease.**—*Nyasaland Dept. Agric. Bull.* 3 (N.S.), 12 pp., 1932.

A preliminary account is given of experiments started in 1929, in which the authors claim to have established that the serious disease (termed yellows in this paper) of the tea bush in Nyasaland, which Butler suggested may be caused by a virus [*R.A.M.*, viii, p. 203], is really due to a deficiency of sulphur in the tea plant. It occurs both on long cultivated, exhausted soils and on virgin soil of the black, friable type that is distributed irregularly throughout the Mlanje tea district, and is particularly troublesome in young plantations. There is also evidence that it is at its worst during the hot, dry season, and gradually lessens from December onwards. Attempts to remedy the condition of the diseased bushes by applications of fertilizers containing potassium, sodium, nitrogen, and phosphorus, but no sulphur, either failed to bring about any improvement, or in some cases even appeared to have a detrimental effect. Applications of sulphur, on the other hand, in the form of ammonium sulphate, potassium sulphate, sodium sulphate, or magnesium sulphate, or even of pure sulphur, in every case resulted in a marked improvement, badly diseased plots giving as much as 85 per cent. recovery after treatment. Applications of such fertilizers to virgin soil prior to planting tea also greatly facilitated the establishment of the young plants, resulting in uniformly healthy stands, while on untreated virgin soil an average of 36 per cent. yellows plants was observed in 1931 after the first year's growth. A significant diminution in the sulphur content of young leaves and to a lesser extent of older ones and stems, was found in the diseased bushes as compared with the healthy. Finally, tea seedlings grown in a full nutrient solution containing sulphur developed normally, while those grown in the same solution but without sulphur reproduced the exact symptoms of the yellows disease. The omission of the other individual constituents from the solution gave rise to pathological symptoms quite different from those of yellows.

Experiments further showed that tobacco plants grown on the Mlanje black soils and on the red soils of diseased tea areas, developed the characteristic general yellowing of the leaves, which has been shown by American workers to be induced by withholding sulphur from the plant. It is believed, therefore, that tobacco may be used as an indicator of sulphur deficiency in soils intended for tea.

While the investigation gave definite indication that the tea yellows disease is produced without the co-operation of a fungus, there was some evidence that affected plants are more liable to infection by weakly parasitic fungi, of which *Rhizoctonia batatícola* [*Macrophomina phaseoli*] appears to be the most important. Applications of sulphate were successful in curing the disease symptoms in tea plants, the roots of which were known to harbour the fungus.

It is believed that the tea yellows disease may be controlled by applications to the soil in diseased areas of ammonium or potassium sulphate at the rate of 1 oz. per old plant (½ oz. per young or supply plant), or pure sulphur at the rate of ¼ oz. per old and ⅛ oz. per young plant. Full use should be made of all available kraal manure, as it should contain an appreciable amount of sulphur, especially in its liquid constituents. Good cultivation should also help to keep the trouble in check. The best time to apply the fertilizer is in November, and the bushes treated should not be pruned heavily until the second year after treatment at the earliest, as there was clear evidence that heavy pruning tended to aggravate the disease.

Virus diseases of Tobacco in Nyasaland.—*Nyasaland Dept. Agric. Bull.* 2 (N.S.), 15 pp., 1932.

In this bulletin brief notes are given on the three virus diseases of tobacco that are known to occur in Nyasaland, namely, leaf curl (the transmission of which by white flies [Aleyrodidae] has been confirmed locally), mosaic, and ring spot. In the section dealing with leaf curl, Storey's recent report on this disease in Rhodesia [*R.A.M.*, xi, p. 676] is reproduced in full. In regard to the control measures recommended by this author, it is stated that in Nyasaland the question is complicated by the fact that, besides one or more species of *Vernonia* (native name 'fusa') which local observations have definitely shown to carry the leaf curl virus, similar symptoms were seen in wild tomato plants, cassava, *Canavalia* sp., *Crotalaria usaramoensis*, and Biloxi soya beans, all these plants also supporting whitefly, though there is still some doubt whether the species concerned is the same [*Bemisia gossypiperda*] that transmits cotton leaf curl in the Sudan.

Mosaic was common in the 1931–2 season and caused more harm than leaf curl. There was some indication that certain soil conditions may be a contributory cause of this disease, and work is in hand to establish whether there is any relation between the nitrogen cycle in the soil and the incidence of mosaic. In the note on ring spot [ibid., viii, p. 204], it is stated that while it may not cause serious damage directly, secondary fungi are liable to develop on the lesions, especially a species of *Phyllosticta*.

GRATZ (L. O.). **Field and laboratory studies of Tobacco diseases.** —*Ann. Rept. Florida Agric. Exper. Stat. for the fiscal year ending June 30th, 1931*, pp. 176–178, 4 figs., 1931. [Received September, 1932.]

Notes are given on the work of the Tobacco Experiment Station at Quincy, Florida, during 1930–1. In May, 1931, tobacco plants in two widely separated seed-beds near Quincy became attacked by blue mould (*Peronospora hyoscyami*) [*R.A.M.*, x, pp. 629, 630], and a little later the disease was found in a few areas of shaded tobacco. Work on the selection of strains resistant to black shank (*Phytophthora*) [*parasitica nicotianae*] was continued [ibid., x, p. 275].

DUFRÉNOY (J.). **Maladie bactérienne du Tabac dans le sud-ouest de la France.** [A bacterial disease of Tobacco in the south-west of France.]—*Ann. des Épiphyties*, xvii, 6, pp. 446–455, 3 pl., 8 figs., 1931. [Received August, 1932.]

After stating that in 1931, as a result of highly favourable weather conditions, tobacco in the south-west of France was very severely attacked by wildfire (*Bacterium tabacum*), which destroyed many of the seed-beds in May and injured the field crop in July, the author gives a semi-popular account of the disease based on his own researches and those of numerous other workers under the headings etiology, causal organism, host reactions, varietal susceptibility, and control. There is a short bibliography.

DUFRÉNOY (J.) & RADOEFF (A.). **Effets du formol sur la germination et la croissance des plantules de Tabac.** [The effects of formalin on the germination and growth of Tobacco seedlings.] *Comptes rendus Soc. de Biol.*, cx, 20, pp. 386–388, 2 figs., 1932.

Tobacco seeds immersed for 15 minutes in commercial formaldehyde at the rate of 4 c.c. in 50 c.c. water against *Bacterium tabacum* and then rinsed are stated to germinate readily and attain a normal height in 15 days, whereas those treated with the undiluted (40 per cent.) formaldehyde solution usually fail to germinate owing to the inhibition of development of the primary roots.

MCMURTREY (J. E.). **Effect of thallium on growth of Tobacco plants.**—*Science*, N.S., lxxvi, 1960, p. 86, 1932.

In connexion with a study of tobacco frenching [*R.A.M.*, xi, p. 7] in Washington, D.C., thallium nitrate, applied in pot cultures at 35 and 75 p.p.m., was found to produce a decidedly toxic effect, most marked in damp soil, in which the stem was frequently killed at soil level. Thallium nitrate was shown not to be readily leached from the soil, so that possibly much smaller quantities of the element may be toxic if evenly distributed through the soil mass.

The first symptom of thallium poisoning is a retardation of the growth rate and the development of pale green areas along the veins of the upper leaves. The younger leaves show chlorosis extending into the smallest branches of the vascular system, but this symptom does not so characteristically originate at the leaf tip and margins as in the case of typical frenching. Leaves subsequently produced are much distorted and may consist only of a midrib. Proliferation of the lateral buds follows, giving a witches' broom effect.

It cannot yet be definitely stated that tobacco frenching is a result of thallium toxicity, but there is evidently much in common between the growth manifestations of both these conditions.

QUANJER (H. M.) & SILBERSCHMIDT (K.). **Über eine komplexe Viruskrankheit der Tomate.** [On a complex virus disease of the Tomato.]—*Phytopath. Zeitschr.*, v, 1, pp. 75–83, 5 figs., 1932.

The failure of Schaffnit and Müller to demonstrate the complex character of streak necrosis of tobacco by means of inoculation

experiments [*R.A.M.*, x, p. 537] led the authors to undertake further tests at Wageningen, Holland, in which the expressed sap of the Magdeburger Blaue potato was substituted for Industrie. Apparently healthy plants of the former variety bear the virus of acropetal necrosis [ibid., xi, p. 740], the action of which on tomato corresponds to that of the 'latent virus' of Burnett and Jones [ibid., xi, p. 595]. The other component of the inoculum was tobacco mosaic obtained from the Amersfoort plantings which supplied Mayer and Beijerinck with their material (*Landw. Versuchsstat.*, xxxii, p. 451, 1886; *Verh. K. Akad. Wetensch.*, 2e Sect., vi, 5, 1898).

On 5th June, 1931, apical shoots of Magdeburger Blaue potatoes were grafted on to four healthy Ailsa Craig tomato plants, on to another four of which Industrie shoots from known virus-free stock were grafted for comparison. The remaining inoculations were made by rubbing the leaves of tomato plants (four in each test) with the expressed sap of each of the two potato varieties (the Industrie being from the virus-free stock to serve as a control), of tobacco mosaic, and of a mixture of the latter with that of each of the potato varieties, respectively. On examination a fortnight later all the plants inoculated by rubbing the leaves with tobacco mosaic showed the symptoms of common tomato mosaic with unevenness of the foliage. All those similarly inoculated with Magdeburger Blaue sap developed a faint spotting without unevenness of the leaves. All the plants inoculated with a mixture of tobacco mosaic and the Magdeburger Blaue virus showed a very severe form of mosaic, with markedly uneven leaves and an upward rolling of the youngest ones and their pinnae, giving a bird's claw appearance. As in the case of tomato streak [ibid., vii, p. 659], dark stripes developed on the veins, petioles, and stems. All the plants on to which Magdeburger Blaue shoots were grafted developed a somewhat more pronounced spotting than those inoculated by rubbing with the sap from this variety, but no inequalities of the leaf blades. The plants on to which Industrie shoots were grafted remained perfectly healthy. Evidently, therefore, the virus disease under discussion is formed of two components, viz., the well-known tobacco mosaic and an acronecrotic virus.

The necrotic action of the double disease was found to be slight, most of the dark stripes disappearing when the stems were placed in alcohol. Some of the elongated cell groups in the subepidermal tissue were found to contain pale chlorophyll grains but only in a few cases was necrosis demonstrated. The fruits were not affected by the disease.

MAIRE (R.). **Deux maladies des Tomates en Algérie.** [Two Tomato diseases in Algeria.]—*Bull. Soc. Hist. Nat. Afrique du Nord*, xxiii, 5, pp. 119–120, 1932.

Since 1911 there have been frequent attacks of *Bacillus* [*Bacterium*] *solanacearum* on tomatoes grown on the Algerian coast during winter, and on one occasion it caused serious losses. The disease is most severe in cold, wet winters and the plants are most liable to attack when the fruit is just beginning to form. As a

result, however, of carrying out the control measures recommended by the local inspection service (consisting in the destruction of diseased plants, careful aseptic precautions against allowing healthy plants to become contaminated, etc.), the disease has been much reduced since 1927.

Green tomato fruits showed a greyish-white hairy efflorescence due to irritation by the mite *Eriophyes calcladophorus* (Nalepa) which led to cracking of the skin and resulted in a bacterial fruit rot; young tomato fruits are also stated to be similarly attacked in Provence.

LIESAU (O. F.). **Zur Biologie von Didymella lycopersici, dem Erreger der Tomatenkrebskrankheit.** [On the biology of *Didymella lycopersici*, the causal organism of the Tomato canker disease.]—*Phytopath. Zeitschr.*, v, 1, pp. 1–40, 9 figs. 3 graphs, 1932.

A comprehensive account is given of the writer's studies at Bonn-Poppelsdorf on the biology of *Didymella lycopersici*, the causal organism of tomato canker [*R.A.M.*, xi, p. 483].

The fungus was found to enter the plants both through the unwounded epidermis and through the stomata, and to dissolve readily the pectin-containing substances forming the middle lamella of the cell wall. In addition to the enzymes dissolving the cell wall the fungus further produces a toxin destructive to the host cell, the contents of which collapse, while the dead cells shrink and cause constriction of the stem at the point of infection. The excretory products of the fungus grown in Richards's solution were found to produce rapid wilting of cut shoots of tomato, the toxicity being greatest when the cultures were maintained at the optimum temperature (19°–21° C.) for the growth of the fungus. Older plants are more liable to infection by *D. lycopersici* than young ones, and it was also observed that susceptibility to the disease is promoted by a shortage of nitrogen and phosphoric acid.

Inoculation experiments with the canker fungus on a number of Solanaceae gave positive results, showing that it is by no means specialized on tomato. Infection developed readily on *Solanum nigrum*, *Nicandra physaloides*, *Physalis francheti*, and *Atropa belladonna*, pycnidia with germinable spores being formed in 13 days as on tomato, whereas in the case of *Capsicum annuum*, *Datura stramonium*, *Hyoscyamus niger*, *Lycium halimifolium*, tobacco, *Petunia hybrida*, potato, eggplant, *S. dulcamara*, *S. capsicastrum*, and a few other plants, the incubation period was much more protracted. No appreciable differences in resistance to canker were detected among a large number of commercial tomato varieties [which are listed].

The course of infection was found to be strongly influenced by the temperature of the environment, which acts more directly on the host than on the fungus. The resistance of the former was found to be strengthened at 22° C. as compared with 5° to 15°. A high degree of atmospheric humidity is requisite for infection. The minimum temperature for mycelial development was found to be 4° to 5°, with an optimum at 20° and a maximum below 32°, the

corresponding points for spore germination being 4° to 5°, 20° to 24°, and 32°. Seedlings in very acid soils are particularly liable to infection. Spore germination takes place through a hydrogen-ion concentration range of P_H 4·3 to 7·4, mycelial growth occurring from 3·9 to 8·10, with an optimum at 5·23. The viability of the pycnospores was found to extend over a considerable period, germination being normal after three months in the laboratory while spores kept for 14 months germinated with some delay and individual ones even after two years' storage.

Control measures are indicated, based on preventive cultural practices supplemented by regular applications of 0·25 per cent. uspulun to the seedlings.

ZANONI (G.). **La moria degli Olmi e i sostegni vivi della Vite.** [Die-back of Elms and the living supports of the Vine.]—*Rivista Agricola*, xxviii, 642, p. 317, 1932.

As the elms in numerous parts of Italy, including Emilia, the Marches, Tuscany, and Umbria have since 1929 been in rapid process of destruction owing to the disease caused by *Graphium* [*Ceratostomella*] *ulmi* [*R.A.M.*, x, p. 633; xi, p. 610], it has been proposed that they should be replaced by resistant varieties such as *Ulmus pumila*, *U. japonica*, and *U. racemosa* [cf. ibid., xi, p. 484]. If these, however, should prove to be unsuited to Italian conditions, the author suggests that the best trees to replace the elms as living supports for vines (which is one of their most important uses in the areas affected) would be maple [*Acer campestris*] and the nettle tree (*Celtis australis*).

DRAGHETTI (A.). **Il decorso della malattia degli Olmi nel Modenese.** [The progress of the Elm disease in the vicinity of Modena.]—*Ann. R. Staz. Sper. Agraria di Modena*, N.S., ii, pp. 300–304, 1932.

Die-back of elms (*Graphium* [*Ceratostomella*] *ulmi*) [see preceding abstract] first appeared in Emilia in 1929, when it was found in one district only. The following year it was definitely identified, and was present sporadically throughout the entire province, 5 to 10 per cent. of the trees being attacked in three localities and rather fewer than 1 per cent. in the rest of the province. In 1931, the disease spread very noticeably, but the trees still remained healthy in certain large areas which had, however, become much smaller in extent by 1932.

The author considers that growers before planting the resistant *Ulmus pumila* on a large scale should await the results of the investigations being made by the various Italian agricultural research institutes into the suitability of this species of elm to the local conditions. Meantime, all infected material should be at once destroyed.

PEGLION (V.). **La stigmatomicosi delle Nocciuole.** [Stigmatomycosis of Hazel-Nuts.]—Reprinted from *Rendic. Sessioni R. Accad. Sci. Ist. di Bologna, 1931–2*, 7 pp., 1932.

After referring to previous records of the insect transmission of *Nematospora coryli* to various hosts [*R.A.M.*, viii, p. 718; x,

pp. 298, 519; xi, p. 353], the author states that a large percentage of insect-infested hazel nuts [*Corylus avellana*] from various parts of Italy and Sicily showed spore masses of the fungus in the internal wall, the spongy part of the husk, and the seed-coat, indicating penetration during the development of the ovary. He obtained evidence many years ago that infection can occur both when the nuts approach maturity and when they are fully developed, the growth and diffuse sporulation of the fungus in such cases becoming arrested. During May and June, in young nuts, he observed characteristic lesions in the cotyledons, in which *N. coryli* was in active growth, from which he deduced that the spores probably penetrated the stele before the pericarp became lignified. Further observations require to be made during the growth of the ovary to determine whether the fungus is or is not definitely parasitic.

BURKE (E.). **Chlorosis of trees.**—*Plant Physiol.*, vii, 2, pp. 329–334, 1 fig., 1932.

Cottonwood [*Populus deltoides*] trees at the Montana Agricultural Experiment Station are subject to chlorosis, which has been found to be curable by the injection into the trunk of a 0·25 per cent. solution of ferrous sulphate. The same treatment also proved beneficial to chlorotic apple trees in the Bitter Root Valley, where the abnormally high calcium content of the soil (over 14 per cent.) renders the iron unavailable [*R.A.M.*, xi, p. 326]. As an alternative 2 or 3 gm. of ferrous sulphate or ferric nitrate salts may be inserted through holes in the trunk and water added to dissolve them, while a still simpler method of treatment consists in driving 15 to 20 iron nails, 1 to 1¼ in. long, into the trees. Spraying with ferrous sulphate or the application of this substance to the soil proved ineffectual.

HIRT (R. R.). **On the biology of Trametes suaveolens (L.) Fries.**—*Bull. New York State Coll. of Forestry*, v, 1c (*Tech. Publication* 37), 29 pp., 7 pl., 1 diag., 1932.

In view of the increasing economic importance of willow (*Salix*) and poplar (*Populus*) species in the timber industry, attention has been directed to the white heart rot of these trees, especially on low, damp sites, caused by *Trametes suaveolens* [*R.A.M.*, ii, p. 284]. In dead trunks the sapwood is also destroyed. The fruiting bodies of the fungus are readily recognizable by their whiteness and characteristic odour of anise, the latter permeating the decayed wood and even persisting for some time after air drying.

The first microscopical sign of decay is the disappearance of the tertiary wall in the fibre tracheids, followed by the dissolution of the secondary wall. In the final stages, the walls of all the elements are riddled with perforations made by the hyphae in passing from cell to cell. Two kinds of hyphae are discernible, namely, large-ones with clamp-connexions and a very fine type without them, the latter being probably responsible for the invasion of healthy wood. Chemical analyses of the normal and decayed heartwood of *S. pentandra* showed that lignin and cellulose were both disintegrated by

the fungus, the latter constituent being mainly attacked [cf. ibid., xi, p. 343].

Basidiospores of *T. suaveolens* were found to retain their viability for over 15 months in the laboratory. Germination was not obtained after exposure to an outdoor temperature of −19° C. During the spring a temporary revival of the sporophores takes place and a crop of viable basidiospores is produced. Germination occurs within 12 to 16 hours and the formation of secondary spores 25 to 30 hours later. In culture certain secondary spores are produced in clusters resembling bulbils. A study of ten monospore cultures of *T. suaveolens* indicated that the fungus is heterothallic, though the sex factors are too complex to describe it as bisexual.

NOJIMA (T.). **Studien über Polyporus japonicus Fries.** [Studies on *Polyporus japonicus* Fries.]—*Forsch. aus dem Geb. der Pflanzenkrankh.*, [Kyoto], i, pp. 175–191, 1 pl., 4 figs., 1931. (Japanese.) [Abs. in *Japanese Journ. of Botany*, vi, 2, pp. (46)–(47), 1932.]

The examination of oak roots naturally infected by *Polyporus japonicus*, supplemented by inoculation experiments, showed that the mycelium is capable of penetrating the cellulose membranes of various cells in the xylem as well as the pores of the vessels round the medullary ray cells. Microchemical investigation of the decay induced in oak wood by artificial inoculation with *P. japonicus* indicated that the fungus belongs to the lignin-dissolving group of white spongy rots [*R.A.M.*, xi, p. 343]. Good growth was made on potato decoction agar and dilute soy-bean agar at 24° to 36° C. while on sawdust or fragments of *Quercus glauca* in Erlenmeyer flasks numerous stalks and occasionally small caps were formed.

KITAJIMA (K.). **Studies on the 'mizogusare-byo' of living 'Hiba' (Thujopsis dolabrata S. et Z.) caused by Fomes robustus Karst. (Résumé.)**—*Bull. Imper. Forestry Exper. Stat.*, Tokyo, 31, pp. 61–62, 3 pl., 1931.

Fomes robustus [*R.A.M.*, vii, p. 406] has been found causing considerable damage to the trunks of 'hiba' (*Thujopsis dolabrata*) trees in the Aomori prefecture, Japan, and is also reported to be parasitic on *Abies sachalinensis* in Hokkaido. The fungus was readily isolated and grew best on carrot and soy-bean agar. The optimum temperature for mycelial growth was found to be between 25° and 32° C., with minima and maxima at 6° to 7° and 37°, respectively.

Microchemical tests and quantitative analyses indicated that *F. robustus* should be placed in the group of lignin-dissolving fungi [cf. ibid., vii, p. 68 and preceding abstract]. It forms black lines in the wood. The phenolic substance contained in 'hiba' wood had previously been shown to be very toxic to most wood-destroying fungi [ibid., viii, p. 4], hence the destructive action of *F. robustus* on the trunk of this tree is of interest.

HEMMI (T.) & NOJIMA (T.). **Über Polyporus mikadoi Lloyd.** [On *Polyporus mikadoi* Lloyd.]—*Fungi* (*Nippon Fungological Soc.*), i, pp. 90–95, 4 figs., 1931. (Japanese.) [Abs. in *Japanese Journ. of Botany*, vi, 2, p. (32), 1932.]

The morphology and wood-decaying action of *Polyporus mikadoi* Lloyd are described.

KAMEI (S.). **On new species of heteroecious Fern rusts.**—*Trans. Sapporo Nat. Hist. Soc.*, xii, 2–3, pp. 161–174, 1932.

In the course of recent studies on the life-histories of fern rusts of Japan, the writer established the heteroecious relationships of 15 species (including nine regarded as new), each of which forms its aecidial stage on the needles of *Abies mayriana* and some also occur on other allied species of *Abies*. Latin diagnoses of seven of the new rusts are given, with taxonomic notes, namely, *Uredinopsis woodsiae* on *Woodsia polystichoides* var. *nudiuscula*, *U. athyrii* on *Athyrium filix-foemina* var. *melanolepis*, *U. hirosakiensis* Kamei et Hiratsuka f. sp. nov. on *Dryopteris thelypteris*, *U. intermedia* on *A. acrostichoides* and *A. pterorachis*, *U. ossaeiformis* on *D. dilatata* and *D. monticola* (alternate hosts, in addition to *Abies mayriana*, *A. sachalinensis* and *A. firma*), *Milesina miyabei* on *D. crassirhizoma*, and *M. dryopteridis* on *D. viridescens*.

KAMEI (S.). **Notes on the cultural study of a new species of Hyalopsora.**—*Trans. Sapporo Nat. Hist. Soc.*, xii, 2–3, pp. 124–129, 3 figs., 1932.

A hitherto undescribed species of *Hyalopsora* distinct from *H. aspidiotus* [*R.A.M.*, ix, p. 420] has been observed parasitizing *Blechnum spicant* var. *nipponicum*, a common fern growing near or under *Abies mayriana* in the vicinity of Sapporo, Japan. Inoculation experiments on *A. mayriana* seedlings with sporidia from overwintered fronds gave positive results in four out of seven cases. The resulting spermogonia were longer (300 to 500 μ) than those of *Peridermium pycnoconspicuum* [ibid., iii, p. 115] but almost equal in width (100 to 200 μ). The fungus is regarded as a new species of *Hyalopsora*, to which the name *H. aculeata* is given, with a Latin diagnosis. According to Prof. Hiratsuka *B. amabile* is also attacked by this species in the Honshû mountains.

SIGGERS (P. V.). **The brown spot needle blight of longleaf Pine seedlings.**—*Journ. of Forestry*, xxx, 5, pp. 579–593, 1932.

An important leaf disease of yellow pine (*Pinus palustris*) seedlings has attracted attention of recent years in South Carolina, Mississippi, and Louisiana. The causal organism, *Septoria acicola* [*R.A.M.*, ix, p. 280], is apparently only injurious to the foliage within 18 inches of the ground. The winter climate being very mild in the areas under consideration, the fungus is able to develop on the needles throughout the year. In the spring, spores from lesions formed on the foliage of the previous growing season start infection on the young elongating needles. An isolated spot may originate at or below the needle tip, where it soon encircles

the leaf in the form of a narrow brown band, usually not more than one-eighth of an inch long and always with definite margins. In small seedlings the green tissue between the original lesions is killed, apparently without direct invasion by the fungus, and after a few weeks the needle begins to die back from the tip. By the end of the summer a diseased needle shows three different zones, viz., the dead tip, a spotted zone alternating with green tissue, and a lower area of sound green tissue. Sometimes the oldest infected leaves are shed by the late summer, and in severe cases the defoliation is sufficient to cause dwarfing.

A comparison in 1930 of the average of 1,200 plants sprayed with Bordeaux mixture and 900 left untreated in the previous year showed that the average increase in growth of the former was 0·37 in. compared with 0·25 in. for the latter. In a further test, 2,179 seedlings were sprayed with Bordeaux mixture, lime-sulphur, or colloidal sulphur, and 1,963 left untreated; the difference in the average height of the sprayed and unsprayed seedlings was 0·16 in. in favour of the former. In another experiment the amount of diseased needle tissue among sprayed plants was found to be less than 1 per cent., compared with 43 per cent. for the untreated. About 8 per cent. of the mortality (164 plants) was attributed to defoliation caused by *S. acicola* in 1929 and 1930.

The influence of the ground cover on the incidence of brown spot needle blight was clearly shown by a test in which all vegetation except pine seedlings was removed from several plots of natural reproduction, a process resulting in an increase in the average incidence of infection from 24 to 43 per cent. in 1929 and to 68 per cent. in 1930.

Periodic winter burning has been recommended for the control of *S. acicola*. The writer found that a single fire reduces the incidence of infection for the following season (up to one-third the amount on an unburned tract). By the end of the second season the influence of fire was negligible on two out of three areas, while on the third the amount of disease was one-half of that on an unburned tract. A fire burning through six-year rough growth caused 8 per cent. mortality and delayed the height increment of one-sixth of the survivors by destroying the terminal bud. On an adjacent unburned area the mortality from all causes was only four-tenths of 1 per cent.

CARTWRIGHT (K. St. G.). **Diseases of timber.**—*Journ. Brit. Wood Preserving Assoc.*, ii, pp. 19–39, 1932.

In this paper, which was read at a meeting of the Auctioneers' and Estate Agents' Institute, the author gives a brief popular account of the various rots caused in constructional timber by wood-destroying fungi, with special reference to mine and house fungi. Some space is given to a discussion of control measures applicable to dwellings, and a reference is also made to wood-staining organisms and their control. The paper contains a list of the chief fungi which attack standing and felled timber in Great Britain, together with a brief description of the morphological characters permitting of their rapid identification.

Fergusson (H.). **Recent developments in wood preservation.**—*Journ. Brit. Wood Preserving Assoc.*, ii, pp. 40–57, 1932.

In this paper, read at a meeting of the British Wood Preserving Association [*R.A.M.*, xi, p. 487], a brief outline is given of the chief methods now in use in various countries for the preservation of large timbers and railway sleepers, with particular reference to impregnation with creosote, which is considered to be the most efficacious for railway engineering purposes and for telegraph poles. This method comprises Boulton's process of boiling the timber (preferably green and unseasoned) under vacuum prior to impregnation; the process known in America as the Lowrie process; and the Rueping or 'empty cell' process [ibid., vi, p. 67]. A passing reference is also made to the methods consisting of impregnating the timber with water-soluble salts, e.g., Boucherie's [ibid., iv, p. 454] and Card's [ibid., viii, p. 4] processes, the former involving the use of mercuric chloride or copper sulphate, and the second the use of an emulsion of zinc chloride and creosote; the recently introduced use of fluorides [ibid., iii, p. 242; iv, p. 388] and silico-fluorides in conjunction with dinitrocresol or salicylic acid; and a proprietary process relying on the production of a copper-chromium compound inside the timber, which appears to be promising.

In a discussion which followed the reading of this paper, the advantages and drawbacks presented by the various creosoting processes were examined at some length, the author defending his view that the best result, in the case of Douglas fir timber, is obtained with Boulton's process which, besides giving good protection against decay, also improves the mechanical properties of the timber.

Bryan (J.). **Methods of applying antiseptics.**—*Forestry*, vi, 1, pp. 75–81, 1932.

The author gives brief technical details of the chief methods in use for the application of antiseptic preparations to industrial wood and constructional timber, most of which have been already noticed in this *Review* [cf. preceding abstract *et passim*].

Campbell (W. G.). **A chemical approach to the study of wood preservation.**—*Forestry*, vi, 1, pp. 82–89, 1932.

After a brief outline of the questions involved in the problem of the preservation of wood from attacks by decaying organisms, the author gives a summarized review of the work done in the study of the chemistry of the rotting of wood by fungi, the results of which indicate that a solution of the problem may lie in the discovery of substances which, when introduced into the timber, will permanently inhibit the key reactions (oxidation and hydrolysis) which accompany the decaying process.

Lindgren (R. M.), Scheffer (T. C.), & Chapman (A. D.). **Recent chemical treatments for the control of sap stain and mold in southern Pine and hardwood lumber.**—Reprinted from *Southern Lumberman*, 2 pp., 15th May, 1932.

Of the large number of chemicals tested in 1930 in Louisiana for

the control of sap stain and mould in southern pine [*Pinus palustris*] and hardwoods (e.g., sap gum [? *Liquidambar styraciflua*], yellow poplar [*Liriodendron tulipifera*], and magnolia) lumber [*R.A.M.*, x, p. 355], only ethyl mercury phosphate, ethyl mercury chloride, sodium orthophenylphenolate, soda, and borax were selected for commercial scale tests on the first-named. In 1931 two further treatments gave promising results, namely, sodium tetrachlorophenolate and sodium 2-chloro-orthophenylphenolate.

Of the substances tested on a large scale in 1930, ethyl mercury chloride and ethyl mercury phosphate gave practically equal control of stain in pine, followed by sodium orthophenylphenolate. Soda, which forms the basis of the compounds used in current treating practices, reduced the incidence of stain appreciably but was much less effective than the foregoing. On hardwoods commercial borax and ethyl mercury phosphate gave equally good control of stain, while ethyl mercury chloride was also satisfactory on sap gum. In 1931 both hardwood and pine logs were immersed for 10 to 15 seconds in solutions at air temperature of the most effective compounds previously tested. After 60 to 90 days' seasoning stain was found to have been well controlled on the hardwoods by 5 per cent. commercial borax, 0·24 per cent. lignasan (ethyl mercury chloride plus inert ingredients), and 0·48 per cent. sodium tetrachlorophenolate. In the case of pine, lignasan, the most effective material in 1930, proved definitely superior to all other treatments at one mill, while in a second series of tests it was slightly inferior to both sodium tetrachlorophenolate and sodium orthophenylphenolate. Of the treatments tested to date, lignasan is the only one that has come into extensive commercial use, but further work is considered essential before definite recommendations can be made for the general adoption of any of the substances used in the present trials.

KITAJIMA (K.) & KAWAMURA (J.). **Über die antiseptische Wirkung der höheren Fettsäuren gegen holzzerstörende Pilze.** [On the antiseptic action of the higher fatty acids towards wood-destroying fungi.]—*Bull. Imper. Forestry Exper. Stat.*, Tokyo, 31, pp. 108–113, 1931.

In connexion with the detection in the etheric oil of 'hiba' (*Thujopsis dolabrata*) of an unsaturated, very strongly antiseptic carbonic acid, probably l-rhodic or menthonic acid, the writers tested the action of a number of fatty acids containing 5 to 18 carbon atoms towards the wood-destroying fungi, *Poria vaporaria* and *Paxillus panuoides* [*R.A.M.*, xi, p. 488] on a medium consisting of malt extract, Liebig's meat extract, and agar.

The results [which are tabulated] showed that 0·01 to 0·10 per cent. concentrations of n-valeric acid (5 carbon atoms), n-caproic acid (6), caprylic acid (8), pelargonic acid (9), n-capric acid (10), menthonic acid (10), citronellic acid (10), geranic acid (10), and undecylic acid (11) inhibited the growth of the organisms. On the other hand, lauric acid (12) and others containing a larger number of carbon atoms were less effective against the fungi, as was also the case with the oxalic acid (2 carbon atoms) and glutaric acid (5).

INDEX OF AUTHORS

	PAGES
Aamodt, O. S.	360
Abbott, E. V.	75, 225, 511, 543
Abe, T.	538, 800
Abramoff, I. N.	35, 87
Acosta, D. R. y	226
Adachi, K.	616
Adam, D. B.	379, 395, 408
Adams, J. F.	354, 560
Addoms, R. M.	317
Agati, J. A.	5, 300
Agee, H. P.	539
Aggéry, Mlle.	305, 651, 729
Agostini, A.	45, 106, 458, 577
Ainsworth, G. C.	679
Aladaba, V. C.	300
Alam, M.	426
Alatorzeff, A. P.	241
Alben, A. O.	683
Alcock, N. L.	222, 255
Alexander, L. J.	152, 408
Allen, R. F.	231, 704
Allen, T. C.	657
Almeida, F. P.	782
Alten, F.	451
Anderson, B. A.	217
Anderson, H. W.	109, 110, 519, 520
Anderson, T. J.	67
Anderssen, F. G.	724
Andrews, F. W.	451
Angell, H. R.	192, 198, 209
Antokolskaya, M. P.	651
Appel, O.	31, 65
Aragão, H. de B.	254
Arango, O.	618
Ark, P. A.	723
Armet, H.	155
Arnaud, F. W. F.	659
Arnaud, G.	404, 442, 525, 550, 566
Arnaud, M.	525
Arthur, J. C.	746
Aschieri, E.	576
Ashby, S. F.	382, 403
Ashcroft, J. M.	410, 551
Ashford, B. K.	646
Atanasoff, D.	745
Atienza, J. D.	73
Atwell, E. A.	14
Babbitt, D. M.	322
Babel, A.	338
Bach, W. J.	570, 640
Bagenal, N. B.	113
Bailey, A. A.	78
Bain, H. F.	187
Baker, C. F.	268
Baker, K. F.	658
Balakhonoff, P. I.	53, 58, 656
Bald, J. G.	78, 549
Balina, P. L.	516
Bamberg, R. H.	103, 434
Banfield, W. M.	461
Banga, O.	250
Barat, H.	432
Bardelli, P.	641
Barger, G.	445
Barnett, E. C.	215
Barrett, J. T.	339
Barrus, M. F.	670, 770
Barthelet, J.	550
Basgal, W.	643
Baudet, E. A. R. F.	374
Baudyš, E.	424
Bawden, F. C.	740, 741
Baxter, D. V.	275, 552
Bayles, B. B.	362
Beale, H. P.	406
Beaumont, A.	558
Bech, P.	196
Becquerel, P.	318
Bell, A. F.	204, 326, 472
Bell, F. G.	277
Benedict, W. V.	143
Benham, R. M.	374, 646
Benincasa, M.	677
Benlloch, M.	307, 347, 348
Bennett, F. T.	504
Bensaude, M.	68
Berg, A.	248
Bergmann, M.	457
Berkeley, G. H.	130, 252, 308
Bertus, L. S.	599
Bever, W. M.	31
Bewley, W. F.	678, 679
Bichet, R.	154
Birkinshaw, J. H.	119
Birmingham, W. A.	114, 185, 519
Bisby, G. R.	545, 546
Black, L. M.	743
Blain, W. L.	97
Blanc, A.	590
Blank, L. M.	489
Blattný, C.	68, 233, 234, 258, 280, 459
Bobilioff, W.	202
Bockmann, H.	444
Boczkowska, M.	455
Bodine, E. W.	169
Bodnár, J.	501, 774
Boedijn, K. B.	548
Boekhout, F. W. J.	374
Boerner, E. G.	232
Bogoyavlensky, A. A.	290
Bolas, B. D.	679
Bolle, P. C.	205
Bolley, H. L.	300
Bonde, R.	598
Bongini, V.	377
Böning, K.	753
Bonne, C.	502
Bordas, J.	791
Borg, P.	769
Bortels, H.	357
Bosberger, J. C. A.	675
Bouriquet, G.	128, 699
Bourne, A. I.	420

	PAGES
Boutaric, A.	663
Bovey, P.	692
Boyce, J. S.	276, 615
Boyd, O. C.	770
Brain, C. K.	572
Branas, M.	154
Brandenburg, E.	127, 147
Brandes, E. W.	265
Brehmer, W. v.	121
Bremer, H.	92, 483, 687
Brenchley, G. H.	59
Bressman, E. N.	33, 502, 565
Brethenoux	260
Brett, M. A.	393
Brewer, P. H.	754
Briant, A. K.	609
Brien, R. M.	365, 547
Briggs, F. N.	500
Brill, O.	14
Briton-Jones, H. R.	283
Britton, W. E.	208
Broadfoot, H.	185, 519
Broadfoot, W. C.	291
Bronsart, H. v.	72
Brooks, A. J.	27, 697
Brooks, A. N.	380
Brooks, C.	55
Brooks, F. T.	59, 517
Brown, A. B.	82
Brown, A. M.	229, 230, 294
Brown, N. A.	357, 656, 682
Brucker, K. W.	186
Bruner, S. C.	618
Brush, W. D.	140
Bruun, S.	196
Bryan, H.	596
Bryan, J.	815
Bryan, M. K.	511
Bubolz, A. A.	373
Buckhurst, A. S.	323
Buckman, S.	758
Buisman, C. J.	138, 212, 409, 483, 484
Buller, A. H. R.	458, 546
Burgeff, H.	317
Burger, F. W.	551
Burke, E.	811
Burkholder, W. H.	418, 556, 772
Burnett, G.	595
Burnett, L. C.	182
Burr, S.	320, 323
Burt, E. A.	268
Burton, G. J. L.	163
Butler, E. J.	545, 562
Butler, W.	436
Cadoret, A.	733
Cairns, H.	396, 746
Caldwell, J.	207, 754
Caldwell, R. M.	440
Calinisan, M. R.	46, 300
Campbell, W. G.	342, 815
Cappelletti, C.	387, 528
Carbone, D.	798
Cardinell, H. A.	787
Carney, L. B.	589
Carrothers, E. N.	746
Cartwright, K. St. G.	342, 413, 684, 814
Catanei, A.	373, 576
Cation, D.	789
Cayley, D. N.	718
Celino, M. S.	316, 662
Chabrolin, C.	153, 351
Chaddock, S.	45
Chamberlain, E. E.	201, 260, 534
Chaplin, C. T.	342
Chapman, A. D.	815
Chapman, G. W.	325
Charles	299
Charles, J. H. V.	119
Chatterjee, N. C.	336
Chaudhuri, H.	372, 507, 797
Cheal, W. F.	202
Cheesman, E. E.	383
Chen, F. K.	44
Chen, H. K.	290
Chester, K. S.	579
Chevalier, A.	241
Chiappelli, R.	262
Chibnall, A. C.	588
Ch'in, T. L.	44
Christensen, A.	117
Christensen, C.	413
Christensen, J. J.	363, 445
Christoff, A.	73, 475, 485, 745
Churchward, J. G.	99
Ciferri, R.	30, 473, 541, 604
Cilli, V.	641
Clague, J. A.	384
Clapper, R. B.	755
Clara, F. M.	378
Clayton, E. E.	279
Cleveland, C. R.	531
Clinch, P.	532
Clutterbuck, P. W.	119
Cocchi, F.	449
Coffman, F. A.	362
Cole, J. R.	551, 683
Combs, W. B.	181
Compton, L. E.	440
Conners, I. L.	495
Cook, H. T.	346, 535
Cook, M. T.	7, 8, 128, 542, 543, 674
Cook, W. R. I.	795
Cooke, F. C.	636
Cooley, J. S.	115, 519
Cooley, L. M.	381, 517
Coons, G. H.	119
Cooper, G. W.	515
Copeland, E. B.	41
Cormier, P.	709
Corneli, E.	653, 692
Corner, E. J. H.	402
Costantin, J.	261
Cotter, R. U.	437, 628
Cottier, W.	394
Cottrell-Dormer, W.	473, 542
Coupan, G.	655
Coyne, F. P.	119
Craddock, S.	45
Craigie, J. H.	262
Crenshaw, J. H.	115
Crosby, C. R.	729
Cross, G. L.	798
Cruess, W. V.	466
Cummins, G. B.	405
Cummins, J. E.	617
Cunningham, G. H.	184, 247, 263, 386, 582, 655

PAGES

Cunningham, H. S. . . . 97
Curini-Galletti, A. . . . 660
Currie, J. F. 318
Currie, M. E. 594
Curzi, M. 6, 20, 384, 405, 462, 746, 748

Dade, H. A. 696, 701, 702, 703, 762
Da Fonseca, O. 645
Dale, H. H. 66
Dampf, A. 463
Dana, B. F. 639
Daniels, A. S. 216
Darrow, G. M. 727
Dastur, J. F. . . . 125, 632
Datta, S. 716
Davenport, A. B. 54
Davey, A. E. 522
Davidson, A. M. . . . 458
Davidson, J. 780
Davidson, R. W. 606
Davies, D. W. 295
Davis, G. N. . . . 421, 447
Davis, R. L. 540
Davis, W. H. . . . 339, 531
Davydoff, P. N. 290
Dawson, M. L. 554
Dawson, P. R. 176
Day, W. R. 140
Dearness, J. 546
De Busk, E. F. 364
De Haan, J. T. 673
Deighton, F. C. 97
Delage, B. 663
Del Cañizo, J. 347
Del Giudice, E. 195
Demaree, J. B. . . . 213, 551
Dennis, R. W. G. . . . 214, 295
De Nucci, L. S. 644
De Paolis, C. . . . 164, 168
Deremiah, J. W. 183
Desai, M. K. . . . 103, 635
Dessy, G. 715
De Tomasi, J. A. 391
Dharmarajalu, K. 781
Dhayagude, R. 106
Dickinson, S. 118
Dickson, B. T. 192
Dickson, H. 593
Dickson, J. G. 447
Diddens, H. A. 578
Diehm, M. M. 102
Diehm, R. A. 263
Dillon Weston, W. A. R. 166, 500, 563
Dippenaar, B. J. 115, 227, 249, 267, 521
Dodds, H. H. . . . 264, 603
Dodge, B. O. 650
Dodoff, D. N. . . 33, 359, 745
Dodonoff, B. A. 64
Doidge, E. M. . . . 105, 793
Doladilhe, M. 663
D'Oliveira, B. 611
Doorenbos, S. G. A. . . . 484
Dopheide, A. B. A. . . 600, 672
Doran, W. L. . . . 420, 589
Dorogin, G. N. 70
Dorph-Petersen, K. . . . 304
Dounine, M. S. . . . 441, 586
Dover, C. 336

PAGES

Dowding, E. S. 458
Dowson, W. J. 112, 114, 115, 311, 322
Draghetti, A. 810
Drake, C. J. . . . 556, 760
Drayton, F. L. 665
Drechsler, C. 302
Dreifuss, M. 15
Duché, J. 325
Dufrénoy, J. 183, 234, 241, 391, 422, 480, 553, 796, 807
Dullum, N. 185
Dunegan, J. C. 583
Dunlavy, H. 639
Du Plessis, S. J. 267
Durrell, L. W. 224
Dykstra, T. P. 667

Eades, H. W. 614
Eaton, E. D. 370
Edgerton, C. W. 265
Eglīts, H. 777, 784
Eglīts, M. 777
Eguës, A. 644
Ehrlich, J. 410, 512
Eichinger 597
Elliott, C. 507
Elmer, O. H. 469
Elze, D. L. 199
Emmons, C. W. . . . 645, 646
Endō, S. . . . 1, 538, 789, 801
Ermolayeva, O. I. 315
Erwin, A. T. 804
Esau, K. 219, 556
Esmarch, F. 38, 668
Euler, H. v. 387, 592
Ewan, J. W. 91
Ezekiel, W. N. 124, 176, 298, 313, 573, 639, 640, 713

Fabiani, G. 516
Faes, H. 24, 187, 692
Fahmy, T. 178, 454
Fajardo, T. G. 691
Falchi, G. 782, 783
Falck, R. 216, 414
Fant, G. W. 132
Faris, J. A. 603
Fawcett, G. L. . . . 128, 562
Fawcett, H. S. . . 509, 571, 779
Feijoo, E. J. C. 644
Fellers, C. R. 384
Fenne, S. B. 133
Fenner, L. M. 210
Fergus, E. N. 460
Fergusson, H. 815
Fernandez, J. 645
Fernow, K. H. 743
Feucht, W. 564
Ficke, C. H. 448
Fife, J. M. 619
Fikry, A. 513
Findlay, W. P. K. . . 342, 757
Finlayson, E. H. 137
Fischer, E. 145
Fischer, R. . . 244, 755, 799
Fisher, D. F. . . 54, 55, 186
Flachs. K. 492, 648
Flor, H. H. . . 440, 705, 706
Foëx, E. . . . 94, 361, 503

PAGES

Foister, C. E. . . . 151, 222
Forsbeck, F. C. . . . 257, 677
Forward, D. F. 628
Foster, W. R. 671
Fowlie, P. 603
Franchini, G. 613
Fransen, J. J. 138
Frémont, T. 234
Frickhinger, H. W. . . 10, 688
Friedrichs, G. 707
Friend, W. H. 570
Friis, S. 196
Fróes, H. P. 242
Fron, G. 217
Fryer, J. C. F. 323
Fudge, J. F. 640
Fujii, S. 44
Fukushi, T. . . . 324, 797

Gadd, C. H. 749
Galloway, L. D. 240
Garbers, F. 13
Garbowski, L. . . . 694, 743
Gard, U. 387
Gardner, M. W. 754
Gassner, G.
98, 166, 167, 231, 288, 358, 703, 704
Gaston, H. P. 787
Gaudineau, M. . . . 442, 566
Geach, W. L. 708
Gehring, A. 470
Ghesquière, J. 621
Ghimpu, V. 77, 606
Ghirenko, V. N. 670
Gibbs, J. G. . . . 415, 555
Gildehaus, E. J. 406
Gill, L. S. 275
Gillett, S. 67
Gilman, J. C. 804
Glass, H. B. 297
Gleisberg, J. 691
Glennie, A. E. 734
Goe 686
Goeze, G. 704
Göllner, J. 619, 620
Goodding, L. N. 139
Goodwin, W. 113
Gordon, W. L. 232
Goulden, C. H. 227
Gourley, J. H. 53
Gouzartchik-Glarner, V. . . 181
Graham, G. S. 641
Graham, J. J. T. 663
Graham, T. W. 445
Gram, E. 117, 162
Gratz, L. O. 806
Gravatt, G. F. 755
Gray, W. G. 413
Greaney, F. J. . . . 286, 294
Green, D. E. . . . 375, 421
Gregor, J. 716
Greve, M. 117
Grieve, B. J. . . . 516, 784
Grigorakis, L. 515
Grooshevoy, S. E. 760
Grossmann, H. 483
Grove, A. 336
Guinier, P. . . . 215, 339
Gunn, K. C. 370

PAGES

Güssow, H. T. 671
Guyot, A. L. 721

Haas, A. R. C. 570
Haasis, F. W. 488
Haenseler, C. M. 350
Hahne, B. 104
Hähne, H. 687
Haigh, J. C. 223
Haines, R. B. 199
Haler, D. H. . . . 714, 715
Hall, A. D. 591
Hamilton, J. M. 788
Hammarlund, C. 220
Hamond, J. B. . . . 79, 338
Hanna, W. T. . . . 289, 443, 775
Hannan, A. M. 387
Hanow 35
Hansbrough, J. R. 615
Hansen, H. N. . . . 477, 522
Hansen, H. P. 197
Hansford, C. G. 353
Hara, K. 329
Harley, C. P. . . . 54, 55
Harman, H. W. 602
Harrington, J. B. 439
Harris, H. M. . . . 556, 760
Harris, J. B. 792
Harris, R. V. . . . 47, 61
Harris, T. H. 143
Hart, H. 562
Harter, L. L. 218
Hartman, H. 57
Harvey, H. W. 621
Haskell, R. J. . . . 132, 232
Hassebrauk, K. 98
Hastings, R. J. 108
Heald, F. D. . . . 53, 429, 658
Hecht, O. 315
Hector, G. P. 157
Heim, R. . . . 325, 492, 590
Hellinger, E. . . . 172, 728
Hemmi, T.
517, 536, 537, 538, 552, 613, 813
Henderson, R. G. 132
Henderson, W. J. 420
Hendrick, J. 759
Henry, A. W. 169
Herbert, F. W. 513
Hesse, G. 36
Hetherington, A. C. . . . 119
Heuberger, J. W. 10
Hewitt, J. L. . . . 366, 367
Hewlett, C. H. 776
Hewlett, J. H. 776
Hey, A. 36
Heyes, T. F. 717
Hicks, A. J. 244
Hicks, H. A. H. G. 336
Hildebrand, E. M. 461
Hill, A. V. . . . 198, 209
Hines, L. 436, 437
Hinks, G. R. 471
Hiratsuka, N. . . . 128, 332, 405
Hirayama, S. 801
Hirt, R. R. 811
Hockey, J. F. . . . 252, 308
Hodson, W. E. H. 558
Holbert, J. R. 297, 447

	PAGES
Holden, H. S.	717
Holman, H. P.	240
Holmes, F. O.	333
Holmes-Smith, E.	17
Holton, C. S.	37
Honecker, L.	101
Honig, F.	16, 490
Hooton, D. R.	240
Hope, C.	370
Hopkins, E. F.	53
Hopkins, J. C. F.	25, 39, 67, 134, 206, 371, 638, 677, 746
Hopkins, S. J.	588
Hoppe, P. E.	447
Horgan, E. S.	176
Horne, A. S.	51
Horne, W. T.	314
Howard, F. L.	594
Hu, C. K.	44
Hubbard, J. W.	513
Huber, G. A.	375, 378
Hubert, E. E.	211
Hubert, K.	564
Hufschmitt, G.	43
Humfeld, H.	803
Humphrey, C. J.	10, 218, 613
Hürländer, L.	13
Hurst, R. R.	246, 259, 276
Husain, M. A.	781
Huskins, C. L.	363
Hynes, H. J.	503
Illingworth, J. F.	116, 191
Ikata, S.	794, 795
Ikeno, S.	786
Ikeya, J.	537
Imamura, A.	1
Irish, J. H.	466
Ito, S.	397, 398
Ivanoff, S. S.	446, 461
Iyengar, A. V. V.	336
Jackson, H. S.	128, 404, 546
Jackson, T. P.	698
Jacobson, H. G. M.	548
Jaczewski, A. A.	41, 273
Jaczewski, P. A.	273
Janssen, G.	453, 638
Jarach, M.	593
Jarrell, T. D.	240
Javoronkova, I.	29, 652
Jehle, R. A.	9
Jenkins, A. E.	723
Jensen, C. E.	196
Jensen, H. L.	601
Jessen, W.	101
Jochems, S. C. J.	134, 477
Joëssel, P. H.	791
Johnson, B.	391
Johnson, D. E.	98
Johnson, E. M.	209, 271
Johnson, F. H.	593
Johnson, J.	135
Johnson, L. R.	323
Johnson, T.	229, 230, 287
Johnston, C. O.	448
Johnstone, K. H.	48. 307
Jones, A. P.	200
Jones, E. T.	295
Jones, F. R.	787
Jones, L. K.	17, 375, 595
Jones, L. R.	302
Jones, W.	402, 602
Jørgensen, C. A.	312
Jørstad, I.	49, 136, 582, 668, 669, 675
Journée, C.	772
Kahsnitz	597
Kaiser, P.	275, 381
Kalajev, A.	798
Kambayashi, T.	576
Kamei, S.	340, 813
Kamesam, S.	216, 685
Kamlah, H.	774
Kämpfer, M.	138
Kangas, E.	486
Kärcher, H.	318
Karling, J. S.	403
Karpova-Benois, E. I.	76
Kawamura, E.	149, 350
Kawamura, J.	816
Kellerman, K. F.	713
Kendall, T. A.	40
Kendrick, J. B.	220
Kern, H.	222
Kervegant, D.	463
Kesten, B. M.	646
Khokhryakoff, M. K.	654
Kiger, C. M.	408
Kimura, J.	398
King, C. J.	370
King, N. J.	794
Kirchhoff, H.	773
Kirkpatrick, T. W.	238
Kitajima, K.	812, 816
Kizeritzky, V. A.	315
Klapp, E. L.	531
Klas, L.	782
Klebahn, H.	256
Klečka, A.	280
Kleine	597
Kling	633
Klotz, L. J.	509, 571
Koch, E.	142
Kochman, J.	459
Köck, G.	71, 566, 734
Koehler, B.	297, 787
Kohl, E. J.	583
Köhler, E.	69, 261, 321, 796
Kokoski, F.	733
Kondo, T.	387
Koolhaas, D.	548
Kordes, H.	92, 620, 655
Korstian, C. F.	140
Kosmat, H.	743
Kotte, W.	581
Kovačevski, I. C.	364, 745
Krahl-Urban, J.	682
Kraybill, H. R.	440, 754
Kreitmair, H.	38
Krohn, V.	146
Kufferath, H.	621
Kunkel, L. O.	408
Kuntz, P. R.	804
Kurata, S.	517, 552
Kuribayashi, K.	400
Kurosawa, E.	400
Kurotchkin, T. J.	44

	PAGES
Kusano, S.	720
Küssner, W.	38
Küster, E	581
Labrousse, F.	150, 344, 735
Lacey, M. S.	17, 700
Lackey, C. F.	688
Lacy, H. E.	384
Lagerberg, T.	372
Lambert, E. B.	764
Landgraf, T.	650
Langeron, M.	476
Larose, E.	772
Laubert, R.	109, 302, 490, 657
Laxa, O.	574
Laycock, T.	285
Layton, D. V.	422
Leach, J. G.	258
Leach, L. D.	419
Leach, R.	805
Leão, A. E. de A.	645
Lebard, P.	261
Lebedeva, L. A.	315
Le Clerg, E. L.	264
Leemann, A. C.	529
Lefebvre, C. L.	299
Lehman, S. G.	18, 19
Lemmerzahl, J.	70
Leonard, L. T.	357
Leonian, L. H.	205, 569
Lepik, E.	24
Lesley, J. W.	335
Leszczenko, P.	706, 743
Leukel, R. W.	232, 567
Leus, S.	10, 613
Leven, G.	757
Levine, M. N.	437, 628
Lewis, R. D.	683
Liesau, O. F.	809
Liese, J.	82, 141
Lilly, C. H.	119
Liming, O. N.	465
Lindeijer, E. J.	411
Lindfors, T.	533, 568
Lindgren, R. M.	815
Linford, M. B.	85, 86, 191, 218, 586
Link, A. de S.	798
Link, G. K. K.	467, 617, 798
Lohwag, H.	81, 337
Lojkin, M.	334
Longrée, K.	69
Loukyanovitch, F. K.	315
Ludwigs, K.	718
Lundegårdh, H.	363
Lunden, A. P.	668, 670
Lurie, R.	684
Luthra, R. S. L. J. C.	221
Lutz, L.	337
MacAloney, H. J.	337
MacClement, D.	735
Machacek, J. E.	294
Macindoe, S. L.	170
Mackie, W. W.	171, 219, 556, 710
MacLeod, D. J.	244, 259, 276, 277
Macpherson, N. J.	491
Macy, H.	181
Madden, G. O.	130, 245
Mader, E. O.	733
Maffei, L.	578
Magee, C. J.	395, 585, 753
Magerstein, V.	274
Magrou, J.	261
Maher, C.	39
Mains, E. B.	170
Maire, R.	808
Maklakova, G. F.	635
Malhotra, R. C.	200
Mallamaire, A.	279
Mandelson, L. F.	76, 555
Mann, R. H.	684
Manns, T. F.	354, 598
Marañon, J.	691
Marchal, E.	182
Marchal, P.	94
Marchionatto, J. B.	499, 505
Marett, P. J.	715
Marsais, P.	153
Marschner, G.	38
Marsh, R. W.	49, 112, 725
Martell, K.	785
Martin, H.	253, 464, 524, 586, 729, 731
Martin, J. P.	4, 328, 674
Martin, W. I.	355, 532, 626
Martinoff, S. I.	745
Martyn, E. B.	26
Marx, T.	395
Mason, F. A.	42
Massey, L. M.	460
Massey, R. E.	451
Mathur, R. N.	573
Matsumoto, T.	700
May, C.	213
Mayne, W. W.	41, 367, 368, 511, 636
Mazé, P.	507
Mazé, P. J.	507
Mazza, S.	644
McArdle, R. E.	527
McCallan, S. E. A.	385, 729
McClean, A. P. D.	66, 209, 481, 541
McClintock, J. A.	111
McCurry, J. B.	96
McDonald, J.	67, 159
McGrath, J. M.	3
McGuire, L. P.	383, 727
McIntosh, A. E. S.	75
McKay, M. B.	667
McKay, R.	689, 739
McLarty, H. R.	248, 270
McLean, L. G.	177
McMurtrey, J. E.	132, 807
McNamara, H. C.	240
McNew, G. L.	447
McRae, W.	424
McWhorter, F. P.	578, 785
McWhorter, O. T.	520
Mead, H. W.	292
Melchers, L. E.	224, 448, 507
Melhus, I. E.	75, 557
Melin, E.	198
Mendoza, J. M.	547
Merkenschlager, F.	395
Metcalfe, C. R.	375
Meurs, A.	332, 480
Meyer, A.	622
Meyer, J.	43, 299, 457, 514, 642
Meyer, K. F.	643
Miklaszewski, S.	149

PAGES

Milan, A. 630, 631
Miles, L. E. 699
Millard, W. A. . . . 294, 323
Miller, E. V. 788
Miller, J. H. 621
Miller, J. W. 558
Miller, P. W. 683
Milochevitch, S. 181
Mitchell, J. E. M. . . . 336
Mitra, M. 393
Moesz, G. 328
Moll, F. 85, 343
Montemartini, L. . . 65, 495
Moore, E. S. 609
Moore, M. B. 446
Moore, M. H. 50
Moore, W. D. 149
Moran, T. 574
Moreau, L. 221
Morgan, W. L. 753
Moritz, O. 361
Morrison, H. B. 181
Mörsdorf 84
Morstatt, H. . . . 107, 665
Morwood, R. B. . . 157, 505, 778
Moss, M. C. 646
Mounce, F. C. 317
Moyer, A. J. 10
Müller, D. 467
Muller, H. R. A. 152
Müller, K. 494
Müller, K. O. 667
Mulligan, B. O. . . . 143, 758
Murphy, P. A. . . 689, 738, 739
Murray, R. K. S. 1, 126, 400, 401, 801
Murwin, H. F. 133
Muskett, A. E. . 380, 396, 413, 746

Nabelek, A. 30
Nagai, I. 1
Nagai, M. 397
Nahmmacher, J. 710
Nakamura, T. 646
Nance, N. W. 658
Nannfeldt, J. A. 606
Nannizzi, A. 106
Naoumoff, N. A. . . 42, 255, 590
Naoumova, N. A. 647
Napper, R. P. N. 402
Narasimhan, M. J. 158
Nassonoff, O. I. 304
Natalyina, O. 45, 59
Nattrass, R. M. 103, 110, 219, 571, 670, 695, 719
Neal, D. C. . . 176, 177, 370
Neatby, K. W. . . . 227, 438
Negroni, P. . 43, 515, 516, 783, 784
Neill, J. C. 32, 505
Nelson, R. 417
Nelson, R. M. 214
Neumann, H. . . . 321, 322
Neuweiler, E. . . 120, 468, 495
Neves, A. 242
Newhall, A. G. . . . 409, 491
Newton, M. . . . 229, 230
Newton, W. . . 108, 245, 468
Nicholls, H. M. 307
Nicolas, G. . . 305, 651, 729
Nielsen, O. . . . 489, 493

PAGES

Nielsen, V. 196
Niethammer, A. 722
Niño, F. L. . 643, 644, 645, 714
Nisikado, Y. . . . 306, 331
Noble, R. J. . . . 222, 780
Nojima, T. . . 536, 812, 813
Nolla, J. A. B. . . . 29, 677
Nord, F. F. 388
Norman, A. G. 3
North, D. S. 541
Nyenhuis, E. M. . . . 522

Obolensky, S. I. 315
O'Brien, D. G. . . . 295, 323
O'Brien, T. E. H. . . . 802
Ocfemia, G. O. . . 46, 183, 203
Oehm, G. 341
Ogden, W. B. 135
Ogilvie, L. . 111, 143, 726, 744, 756, 758
Ohara, K. 616
Okamura, E. 800
Oldaker, C. E. W. . . 122, 322
Olitsky, P. K. . . . 257, 677
Oliver, H. G. 645
Oltarjevski, N. P. . . . 93
Orchard, O. B. 679
Orian, G. . . . 265, 495, 604
Orton, C. R. . . . 386, 446
Osterwalder, A. 247
Overdijkink, G. A. . . . 336
Owen, W. L. 710

Pack, D. A. 490
Paillot, A. 246
Palant, M. 645
Palm, B. T. . . . 301, 430
Palmiter, D. H. 461
Papaeva, N. A. 47
Pape, H. . . 244, 245, 301, 489
Parievskaya, A. P. . . . 45
Parish, H. J. 45
Park, M. . . 510, 599, 601
Parker, E. R. 314
Parker, R. N. 797
Parks, T. H. 726
Pascalet, M. 761
Pasinetti, L. . . . 99, 100
Passalacqua, T. . . . 116, 673
Passecker, F. 492
Passmore, F. R. 175
Pastac, I. 664
Pearson, N. L. 170
Pearson, R. S. 487
Pedersen, A. 196
Peelen, J. R. C. 673
Peglion, V. 810
Perotti, R. 65
Pescott, R. T. M. 379
Petch, T. . 179, 241, 299, 455, 573, 640
Petersen, W. 775
Peterson, R. F. 439
Pethybridge, G. H. . . . 423
Petit, A. . . 100, 436, 442, 443
Petrak, F. 129, 328, 604
Petri, L. . 21, 173, 199, 485, 591, 765
Peturson, B. . . . 228, 233
Peuser, H. 228, 277
Pezzi, G. 458
Pfältzer, A. . . . 470, 539

PAGES

Pflug 84
Philipp, W. 720
Phillips, J. . . . 258, 592
Picado, C. 369
Pichler, F. 567
Pierce, L. 660
Pierstorff, A. L. 305
Piettre, M. 663
Piguet, G. A. 21
Piper, R. B. 378
Pittman, H. A. 8, 253, 397, 567, 607, 618, 779
Plakidas, A. G. 463
Plaut, M. 664
Plettenberg, v. 142
Poeverlein, H. 580
Poli, P. 202
Pollacci, G. . . . 281, 575
Pomerleau, R. 553
Popham, F. J. . 145, 413, 488, 685
Popp, M. 581
Popp, W. 289, 443
Porter, D. D. 240
Porter, D. R. . . . 320, 557
Porter, R. H. 349
Poulsen, A. 117
Prasad, H. H. 344
Prentice, E. G. 323
Preston, N. C. . . . 146, 623
Preti, G. 719
Priode, C. N. 327
Prissyajnyuk, A. A. . 281, 285, 709
Pucher, G. W. 775
Puntoni, V. 117

Quairière, C. J. 338
Quanjer, H. M. . . . 394, 807
Quirk, A. J. 226

Rabanus, A. 83
Rabien, H. 773
Rabinovitz-Sereni, D. 173, 174, 175, 736, 737
Radoeff, A. 807
Raeder, J. M. 31
Raistrick, H. 119
Ramsey, G. B. . . 78, 467, 617
Rangaswami, S. 81
Rankin, W. H. . . . 381, 410
Rant, A. 193
Raphael, T. D. 587
Rathschlag, H. 444
Ratliffe, G. T. 177
Ravaz, L. 220, 221, 350, 622, 623, 693, 764, 765
Rayss, T. . . . 296, 605, 711
Rea, H. E. 639
Read, F. M. 56
Read, W. H. 678
Redaelli, P. . . . 43, 642
Reddick, D. . . . 397, 672
Reddy, C. S. . 182, 296, 421, 448
Reed, G. M. . . 233, 445, 506
Reeves, E. L. 186
Régnier, R. 527
Reichert, I. . 34, 172, 360, 728
Reid, W. D. 418
Reinecke, O. S. H. . . . 789
Reiss, F. 242

PAGES

Reitsma, J. 681
Reydon, G. A. 72
Reynolds, E. B. 176
Rhoads, A. S. . . 364, 365, 382
Richardson, J. K. 279
Richter, H. 274
Říha, J. 261
Riker, A. J. . . 461, 555, 657
Riker, R. S. . . . 302, 555
Rintoul, M. L. 119
Rintoul, W. 119
Rislund, G. 387
Risum, J. N. 196
Rivalier, E. 795
Rivers, T. M. 734
Rives, L. 358
Roberts, J. W. 660
Robertson, H. T. 293, 294, 303, 708
Robertson, I. M. 122
Robinson, R. 119
Rochlin, E. J. . . . 68, 121
Rodigin, M. N. 47
Roeder, W. v. 651
Roemer, T. . . . 66, 774
Roger, J. C. 248
Rogers, L. A. 467
Roldan, E. F. . 203, 266, 403, 777
Rolet, A. 578
Rosella, E. . . . 361, 503
Rossi, V. 475
Roth, E. 650
Roth, L. E. 774
Rothmaler, B. 534
Roxas, J. V. 204
Ruehle, G. D. 309
Ruggieri, G. 175
Rumbold, C. T. 340
Russell, R. C. 291
Russell, T. A. 631
Ryakhovsky, N. 73

Sabalitschka, T. 466
Sackett, W. G. 224
Salaman, R. N. . . 594, 598, 740
Sallans, B. J. 292
Salmon, E. S. 93, 113, 127, 253, 423, 471, 539, 659, 731
Sampietro, G. 400
Sampson, K. 246
Samson, R. W. 754
Samuel, G. . 78, 334, 549, 680
Sanderson, A. R. . . . 2, 324
Sandu, C. 312
Sanford, G. B. . . . 233, 246
Sardiña, J. R. 346
Sartorius, O. 764
Sartory, A. & R. 43, 299, 457, 514, 642
Sathe, T. R. 255
Satoh, S. 799
Săvulescu, T. 156, 296, 312, 605, 711
Sawada, K. 205
Sawyer, W. H. 371
Scaramella, P. . . 389, 412, 641
Schaffnit, E. 799
Scheffer, T. C. 815
Scheibe, A. 31
Schlumberger, O. . . . 65, 320
Schmidt, A. 459
Schmidt, E. 361

	PAGES
Schmidt, E. W.	687
Schmitz, H.	758
Schneider	633
Schneiderhan, F. J.	587
Schnicker, J. L.	314
Scholz, W.	721
Schreiber, F.	618
Schütz, W.	169
Schwalbe, C. G.	15, 554
Schwartz, G.	589
Schweizer, G.	547
Scott, C. E.	249
Scott, J.	516
Scott, R. C.	568
Seal, J. L.	345
Semichon, J.	693
Sempio, C.	730, 731
Senn, P. H.	778
Servazzi, O.	612
Seto, F.	536, 537
Severin, H. H. P.	419
Seydel, S.	795
Shapovalov, M.	210
Sharples, A.	324, 672, 744
Shear, C. L.	187
Sheffield, F. M. L.	335
Shepherd, E. F. S.	127
Shen, C. I.	746
Shewell-Cooper, W. E.	686
Shimada, S.	303, 537
Shimamura, M.	538
Shitikova-Roussakova, A. A.	286, 627, 628
Sibilia, C.	166
Sideris, C. P.	129, 330, 546
Siegler, E. A.	378
Siggers, P. V.	813
Sigot, A.	180
Silberschmidt, K.	807
Simmonds, J. H.	40, 192, 252
Simmonds, P. M.	291
Simsky, A. M.	441, 586
Sirag-el-Din, A.	39
s'Jacob, J. C.	601
Skutch, A. F.	312
Sleeth, B.	422
Sleumer, H. O.	569
Small, T.	211, 493
Smarods, J.	768
Smith, A. M.	122
Smith, C. O.	249, 339
Smith, E. C.	574
Smith, F. E. V.	25, 61, 365, 388, 397, 508, 547, 585
Smith, J. H.	66, 735
Smith, K. M.	394
Smith, R. E.	477
Smith, R. W.	362
Smith, W. K.	705
Snell, W. H.	142
Snyder, W. C.	555
Solheim, W. G.	129
Solkina, A.	310
Solovieff, F. A.	680
Solunskaya, N.	91
Somazawa, K.	700
Sorauer, P.	526
Soriano, S.	269
Spangenberg, J.	630
Sparrow, F. K.	605, 675
Spaulding, P.	337, 615
Spitzer, G.	102
Sreenivasaya, M.	81, 336
Staab, A.	15
Staehelin, M.	187, 692
Stahel, G.	236, 637, 703
Stakman, E. C.	436, 437, 543
Staner, P.	2, 20
Staniland, L. N.	558
Stanley, A. R.	446
Stanton, T. R.	362, 506
Stapp, C.	336, 357
Stegemann	775
Stein, E.	627
Steinberg, R. A.	392
Steinmann, A.	131
Stell, F.	433
Sternberg, C.	242
Sternon, F.	457
Stevens, F. L.	73, 129, 316, 662, 780
Stevens, N. E.	187, 584, 658, 662, 761
Stewart, R. A.	643
Steyn, D. G.	457
Stilbach, K.	760
Stirrup, H. H.	91, 654
Stocker, W.	36
Stolze, K. V.	347
Stone, G. M.	440
Storey, H. H.	66, 76, 427, 506, 591, 676, 711, 805
Stoughton, R. H.	297, 712
Stout, G. L.	249
Stovall, W. D.	373
Stoyle, J. A. R.	119
Straib, W.	166, 167, 231
Straňák, F.	280
Streeter, L. R.	733
Strong, F. C.	251
Strong, M. C.	119, 251
Strzałkowska, H.	482
Subrahmanyan, V.	255
Sullivan, J. T.	440
Sundararaman, S.	223
Supper, R.	707
Suzuki, H.	536
Swanback, T. R.	548
Swift, M. E.	581, 650, 718
Swingle, H. S.	299
Sydow, H.	129, 474
Szilvinyi, A.	757
Tai, F. L.	131, 674
Takimoto, S.	108
Talice, R. V.	456, 476
Tamura, T.	14
Tapke, V. F.	165, 362, 633
Tate, H. D.	556, 760
Taubenhaus, J. J.	124, 298, 313, 573, 639, 640, 713
Tavel, C. v.	619
Tehon, L. R.	521
Tempany, H. A.	768
Temple, C. E.	557
Teng, S. C.	298, 324, 545
Tengwall, T. A.	71
Terényi, A.	501
Thieme, P.	103

PAGES

Thom, C. 119, 803
Thomas, H. E. . . . 187, 727
Thomas, J. A. . . . 227, 499
Thomas, R. P. 9
Thompson, A. . . 105, 354, 769
Thornberry, H. H. . 109, 110, 525
Thorold, C. A. . . . 107, 474
Thung, T. H. . 333, 478, 749, 750
Tilford, P. E. 460
Tims, E. C. 265
Tisdale, W. B. . . . 407, 770
Tisdale, W. H. 733
Tochinai, Y. . . 303, 535, 538
Togashi, K. . . . 17, 60
Tomkins, R. G. . 63, 189, 366, 574
Tompkins, C. M. . . . 490
Tornow, E. . . . 361, 706
Toumanoff, C. 179
Townsend, G. R. . . . 491
Trifonova, V. 745
Trochain, J. 92
Trout, S. A. 366
Truscott, J. H. L. . . . 434
Tscholakow, J. W. . . . 288
Tubeuf, C. v. 81
Tucker, J. 258
Tulasne, C. 197
Tulasne, L. R. 197
Tullis, E. C. 469
Tunstall, A. C. 273
Turner, D. M. 294
Turner, E. 380
Turner, H. A. 112
Tverskoy, D. L. 76

Ukkelberg, H. G. . . . 436
Ultée, A. J. 636
Unamuno, L. M. . . 328, 604
Uppal, B. N. 103, 104, 150, 282, 560, 621, 634, 635
Urríes y Azara, M. J. de . . 675

Vageler, P. 451
Valleau, W. D. . . 209, 271, 407
Vámos, L. 575
Van Beyma Thoe Kingma, F. H. 108, 404
Van Beynum, J. . . . 374
Van der Byl, P. A. . . . 427
Van der Muyzenberg, E. W. B. . 690
Van der Plank, J. E. . . . 105
Van Hell, W. F. . . 108, 243
Vanine, S. I. . 78, 83, 483, 612, 616
Van Poeteren, N. . . 95, 766
Van Slogteren, E. . . . 376
Vanterpool, T. C. . . 289, 434
Van Vliet, J. I. 12
Vaughan, E. K. 792
Venkatarayan, S. V. . . . 509
Verderevsky, D. 556
Verge, G. 350
Verguin, J. 654
Verhoeven, W. B. L. . . . 64
Vernon, T. R. 197
Verplancke, G. 121, 123, 198, 649, 742, 800, 802
Verwoerd, L. . . 164, 230, 267
Vestal, E. F. 277
Viala, P. 693

PAGES

Vickery, H. B. 775
Vidal, L. F. 74
Vilkaitis, V. 632
Vinet, E. 221
Vinson, C. G. . . 334, 406, 407
Vogel, F. 463
Voglino, P. . . . 137, 375
Vouk, V. 782
Vuillemin, P. 372
Vukolov, V. 459

Wager, V. A. . 122, 123, 125, 330
Wagner, F. A. 507
Wahl, H. A. 792
Waksman, S. A. . . . 3, 263, 470
Walker, A. R. 251
Walker, M. M. 725
Walker, O. F. 671
Wallace, G. B. . 235, 474, 572, 697
Wallace, J. M. 437
Wallengren, H. 456
Walters, E. A. . . . 26, 698
Wardlaw, C. W. 190, 312, 382, 383, 464, 727
Ware, J. O. . . . 453, 638
Ware, W. M. 93, 107, 113, 127, 423, 471, 539, 659
Waterhouse, W. L. . . . 629
Waterman, A. M. . . . 516
Waters, R. 641
Waugh, J. G. 407
Weber, A. 460
Weber, E. 463
Weber, G. F. . 349, 417, 421, 803
Weidenhagen, R. . . . 388
Weiler 688
Weill, J. 642
Weiss, A. 274
Weiss, F. 785
Welch, D. S. 412
Welsh, J. N. 362
Weniger, W. 627
Wenzel, A. 147
Werneck, H. L. 19
West, C. 247
Westcott, C. 784
Westenberg, J. 610
Wester, R. E. 370
Westerdijk, J. 484
Weston, W. H. 634
White, D. M. 332
White, R. P. . 374, 376, 411, 649
Whitehead, T. . 200, 318, 319, 345
Wiebe, G. A. 362
Wilcox, H. 798
Wilcoxon, F. . . . 385, 729
Wille, J. 455
Williams, O. B. 297
Willison, R. S. . . 130, 249, 790
Willrich, O. 83
Wilson, A. R. 376
Wilson, E. E. 310
Wilson, J. J. 296
Wiltshire, S. P. 123
Wingard, S. A. 132
Winkelmann, A. . . 37, 254, 502
Wolf, F. A. 133, 512
Wollenweber, H. W. . 145, 274, 339

	PAGES
Wolman, E. H.	84
Wood, J. I.	769, 770
Woodfin, J. C.	221
Woodman, R. M.	194, 522, 523, 587
Woodroof, N. C.	453
Woolliams, G. E.	270, 278, 308
Wormald, H.	21, 57, 311, 338, 379, 584, 657, 726
Wright, C.W.B.	522, 523
Wright, J.	696, 703, 763
Yamano, Y.	11
Yarwood, C. E.	377
Yossifovitch, M.	660
Young, H. C.	152, 408
Young, V. H.	453
Young, W.	119
Young, W. H.	638
Yu, T. F.	290
Zaleski, K.	418
Zanoni, G.	810
Zaprometoff, N. G.	182, 756
Zaumeyer, W. J.	218, 617
Zeiner, W.	775
Zeller, S. M.	110, 183, 661, 727, 792

GENERAL INDEX

Abaca, see *Musa textilis*.
Abavit B, absorption of mercury from, by wheat, 168.
— —, effect of, on germination of wheat, 168, 169, 567, 773.
— —, factors affecting the action of, 707, 773.
— — injury, 773.
— —, stimulatory action of, 567, 708.
— —, use of, against *Calonectria graminicola* on rye in Germany, 707; against *Cercospora beticola* on beet in Spain, 348; against *Fusarium* on wheat, *Helminthosporium gramineum* on barley, and *Ustilago avenae* on oats in Sweden, 568.
Abelicea hirta, (?) *Fomes ulmarius* on, in Japan, 614.
Abies, Echinodontium tinctorium on, in Canada, 614.
—, *Polyporus schweinitzii* on, in Japan, 614.
—, — *sulphureus* on, in Canada and Japan, 614.
—, *Pucciniastrum chamaenerii* on, in France, 339.
— *balsamea, A. cephalonica*, and *A. concolor, Dasyscypha calyciformis* on, in Norway, 136.
— *firma, Fomes pinicola* on, in Japan, 614.
— —, *Uredinopsis ossaeiformis* on, in Japan, 813.
— *fraseri* and *A. grandis, Dasyscypha calyciformis* on, in Norway, 136.
— *mayriana, Hyalopsora aculeata* can infect, 813.
— —, *Milesina dryopteridis* on, in Japan, 813.
— —, — *jezoensis* on, in Japan, 340.
— —, — *miyabei, Uredinopsis athyrii, U. hirosakiensis, U. intermedia, U. ossaeiformis*, and *U. woodsiae* on, in Japan, 813.
— *nobilis, Dasyscypha calyciformis* on, in Norway, 136.
— *nordmanniana, Dasyscypha calyciformis* on, in Norway, 136.
— —, *Polyporus berkeleyi* on, in Russia, 680.
— *pectinata, Dasyscypha calyciformis* and *Rehmiellopsis abietis* on, in Norway, 136.
— *sachalinensis, Fomes laricis* on, in Japan, 614.
— —, — *robustus* on, in Japan, 812.
— —, *Ganoderma applanatum* on, in Japan, 11.
— —, *Trametes pini* on, in Japan, 614.
— —, *Uredinopsis ossaeiformis* on, in Japan, 813.
— *sibirica, Dasyscypha calyciformis* and *Rehmiellopsis abietis* on, in Norway, 136.
Absidia glauca in soil in France, 325.
— *spinosa* in soil in U.S.A., 264.
Abutilon, infectious chlorosis of, in Germany, 256.
—, *Sclerotium rolfsii* on, in India, 158.
— *avicennae, Cladosporium herbarum, Fusarium*, and *Macrosporium abutilonis* on, in Russian Central Asia, 183.
— *striatum*, infectious chlorosis of, biochemical studies on, 387, 592; note on, 406; occurrence in Sweden, 387, 592; in U.S.A., 406.
Acacia, Stereum purpureum on, in New Zealand, 247.
Acanthorhynchus vaccinii on cranberry in U.S.A., 188.
Acaulium albo-nigrescens and *A. nigrum* referred to *Microascus*, 6.
Acer, Verticillium on, in U.S.A., 411.
— *monspessulanum, Septoria monspessulani* on, in Spain, 329.
— *negundo, Verticillium albo-atrum* on, in Bulgaria, 745.
— *palmatum, Phomopsis* on, in U.S.A., 411.
— *pictum, Fomes vegetus* on, in Japan, 12.
— —, *Ganoderma applanatum* on, in Japan, 11.
— *platanoides, Armillaria mellea* on, in U.S.A., 411.
— —, obscure disease of, in U.S.A., 411.
— —, *Polyporus* [*Fomes*] *connatus* and *Taphrina acerina* on, in Norway, 137.
— —, *Uncinula tulasnei* on, in Norway, 136.
— —, *Verticillium albo-atrum* on, in U.S.A., 755.
— *pseudoplatanus, Verticillium dahliae* can infect, 550.
— *saccharum, Verticillium albo-atrum* on, in U.S.A., 755.
Acetaldehyde, effect of, on *Trichoderma lignorum*, 63.
Acetic acid, injury caused by, to seed-grain, 566.
— —, toxicity of, to micro-organisms, 466.
— —, use of, against damping-off of pine and other plants, 496; against *Sclerotinia minor* on lettuce, 492; against *Ustilago panici-miliacei* on *Panicum miliaceum* and against wheat bunt, 566; as a soil disinfectant, 589.
Acetobacter on dates in U.S.A., 384.
Achlya americana, A. flagellata, A. flagellata var. *yezoensis*, and *A. oryzae* on rice in Japan, 397.
Achorion on man in the Argentine, 43.
— *gypseum*, ascigerous stage of, 575.
— —, pleomorphism in, 645.
— *schoenleini*, cultural studies on, 373.
— —, effect of *Staphylococcus* and Staphylococcic antivirus on, 516.
— — var. on man in China, 44.

Acids, fatty, toxicity of, to *Paxillus panuoides* and *Poria vaporaria*, 816.
Acremoniella in a butter churn in U.S.A., 181.
— on cotton in Rhodesia and (?) Uganda, 638.
Acremonium griseum on a lepidopteron, *Mydaea*, and spiders, 179.
Acriflavine, use of, in a culture medium for *Coccidioides immitis*, 643.
—, see also Dyes, aniline.
Acronecroses of potato in England, 741; relation of, to a tomato virus disease, 808; to healthy potato virus, 808; synonymy of, 741; types of, 741.
Acropetal necrosis of potato, histological effects of, 741; relation of *y* virus to, 741; synonymy of, 740.
Acropyga pickeli in relation to phloem necrosis of coffee in Brazil, 637.
Acrostalagmus cinnabarinus on the horse in Africa, 577; in Cyrenaica, 458.
— — on man in Italy, 577.
— *koningi* in soil in France, 325.
— —, *Trichoderma koningi* renamed, 325.
—, see also *Cephalosporium*.
Acrotheca pedrosoi on man in (?) the Argentine, Brazil, (?) Cuba, (?) Russia, and (?) Sumatra, 645; transference of to *Trichosporum* not accepted, 645.
Actinomeris alternifolia, ring spot of tobacco affecting, in U.S.A., (?) 132, 133.
Actinomyces, decomposition of hemicelluloses by, 263; of straw by, 3.
— on man in the Argentine, 43; in Germany, 242. (See also *Nocardia* on.)
— on strawberry in U.S.A., 355.
(?) — on sweet potato in U.S.A., 535.
—, separation of the genus *Proactinomyces* from, 602.
— *albus* in soil in France, 325.
— *allenbachii* on man in France, 514.
— *bovis* on man in Brazil, 242.
— *cretaceus* on beet in Esthonia, 25.
— *dermatonomus* on sheep in New Zealand, 641; in S. Africa, 457.
— *flavus* on potato in England, 200.
— *griseus* in soil in France, 325.
— *intermedius* and *A. nigrificans* on beet in Esthonia, 25.
— *pulmonalis* on man in France, 515.
— *rosellus* on beet in Esthonia, 25.
— *scabies* on potato, control, 123, 259, 321, 355, 397, 597, 626, 671; effect of, on acidity of the tuber, 122; factors affecting, 26, 597, 626, 668; histogeny of, 200; legislation against, in Poland, 272; nature of resistance to, 69; occurrence in Canada, 259; in England, 122, 200; in Germany, 69, 320, 533, 559, 597; in Jamaica, 26; in Norway, 670; in S. Africa, 123; in U.S.A., 355, 532, 626, 668, 671; in Western Australia, 397; studies on, 69, 200; varietal susceptibility to, 69, 320, 533.
— *tenax* and *A. violaceus* on beet in Esthonia, 25.
Actinomycete on rose in Czecho-Slovakia, 459.
— on strawberry in Holland, 250.
Actinomycetes in soil in Australia, 601.
—, taxonomy of, 601.
Aczol, toxicity of, to wood-destroying fungi, 14.
Adhesol as a constituent of tetracuprite dust, 154.
Aecidium on eggplant in Madagascar, 699.
— *cantensis* on potato in Peru, 226.
Aegilops ventricosa, *Tilletia caries* can infect, 360.
Aero Smoke, toxicity of, to *Sclerotinia americana*, 385.
Aeroplanes, use of, in dusting, 286, 287.
Agave americana, *Diplodina agaves* on, in Hungary, 328.
Ageratum conyzoides, *Rhodochytrium spilanthidis* on, in Sumatra, 301.
Agglutination, see Serological studies.
Agral I, use of, as a spreader, 211, 732.
Agropyron repens, *Helminthosporium tritici-repentis* on, in Poland, 695.
Agrostis, *Puccinia graminis* on, in S. Africa, 231.
—, *Sclerotium rhizodes* on, in England, 423, 654.
— *alba* var. *stolonifera*, see *A. stolonifera*.
— *stolonifera*, *Calonectria graminicola* on, in Great Britain, 246.
— —, *Helminthosporium* on, in U.S.A., 161.
— —, *Scirrhia* (?) *agrostidis* on, in France, 722; synonymy of, 722; *Hadrotrichum virescens* conidial stage of, 722.
Ailanthus, *Verticillium dahliae* on, in France, 550.
— *glandulosa*, *Verticillium albo-atrum* on, in U.S.A., 755.
— —, — *dahliae* on, in France, 95, 550.
Aithaloderma camelliae on *Camellia japonica* in Japan, 330.
— *japonica* on oak in Japan, 330.
— *phyllostachydis* on *Arundinaria simoni* and *Phyllostachys reticulata* in Japan, 330.
Albizzia procera, *Fomes pachyphloeus* on, in the Philippines, 613.
Alder (*Alnus*), *Didymosphaeria oregonensis* on, in U.S.A., 139.
Aleurites fordii, *Phytophthora* (?) *palmivora* on, in India, 509.
Aleurodidae, see Aleyrodidae.
Aleyrodes, *Gonatorrhodiella coccorum* on, 179.
(?) —, *Oospora insectorum* on, 179.
— *citri*, *Verticillium cinnamomeum* on, in U.S.A., 641; previously referred to *V. heterocladum*, 641.
Aleyrodid, *Hypocrella philippinensis* on an, in the Philippines, 455; *Aschersonia philippinensis* conidial stage of, 455.
Aleyrodidae, transmission of leaf curl of tobacco by, in Java, 479; in Nyasaland, 806; in Tanganyika, 76; of mosaic of cassava and *Manihot glaziovii* by, 621.
Alfalfa, see Lucerne.

Allantospora onychophila renamed *Hyalopus onychophilus*, 576.
Allium, *Puccinia allii*, *P. porri*, and *Uromyces ambiguus* on, in Switzerland, 619.
— *cepa*, see Onion.
— *porrum*, see Leek.
— *sativum*, see Garlic.
Alloiophylly of anemone in Germany, 256.
Almond (*Prunus amygdalus*), *Ascochyta chlorospora* on, legislation against, in Spain, 752.
—, *Endothiella* (?) *gyrosa* can infect, 611.
—, *Gloeosporium amygdalinum* on, in S. Africa, 115, 249.
—, *Puccinia pruni-spinosae* can infect, 249.
Alnus, see Alder.
Alopecurus pratensis, *Claviceps purpurea* in seed samples of, in Denmark, 304.
Alternaria in butter churns in U.S.A., 181.
— in soil in U.S.A., 264.
— on apple in U.S.A., 656.
— on apricot in France, 23.
— on barley in Canada, 293.
— on celery in U.S.A., 761.
— on chilli in U.S.A., 804.
— on cotton in Peru, 225.
— on date palm in U.S.A., 572.
— on lemon in Sicily, 449.
— on locusts in Russia, 42.
— on orange in the Caucasus, 636.
— on rice in U.S.A., 159.
— on tobacco in India, 426.
— on wheat in Canada, 291, 292.
—, saltation of, to *Stemphylium*, 393.
— stage of *Phoma conidiogena*, 581.
— *brassicae* var. *nigrescens* considered identical with *A. cucumerina*, 696.
— — var. *tabaci* probably identical with *A. tabacinum*, 156.
— *citri* on orange in Uruguay, 226.
— *cucumerina* on cucumber and melon in U.S.A., 557.
— — on watermelon in Cyprus, 696; *A. brassicae* var. *nigrescens* considered identical with, 696.
— *dianthi* on carnation in U.S.A., 497.
— — on *Dianthus tristis* in Bulgaria, 475.
— *gossypina* on cotton in Rhodesia, 371, 638; *Macrosporium gossypinum* renamed, 371.
— *longipes* on tobacco in Rhodesia, 207.
— *macrospora* on cotton in Rhodesia, 638.
— *polymorpha* (?) identical with *Phoma conidiogena*, 374.
— *sesamicola* on sesame in Japan, 350.
— *solani* on chilli in U.S.A., 803.
— — on potato, control, 67, 125, 159, 397; occurrence in Cyprus, 670; in India, 159; in Jamaica, 26, 397; in Kenya, 67; in Rhodesia, 67; in S. Africa, 125; in Uganda, 353.
— — on tomato, control, 753; note on, 355; occurrence in New S. Wales, 753; in S. Australia, 680; in U.S.A., 355; study on, 680.
— *tabacina* on tobacco, *Alternaria brassicae* var. *tabaci* (?) identical with, 156; factors affecting, 135; morphology of, 156; occurrence in Hungary, 135; (?) in Rhodesia, 135, 207; in Rumania, 156; polymorphism in, 207; study on, 135; varietal susceptibility to, 135.
[*Alternaria*] *tenuis*, conidial stage of *Pleospora alternariae*, 77.
— — on beet in Germany, 147.
— — on cacao in the Dominican Republic, 30.
— — on cotton in Rhodesia, 638.
— — on soy-bean in Siberia, 89.
— — on tobacco in U.S.A., 135.
— *tomato* on tomato, 680; in U.S.A., 771.
Althaea, see Hollyhock.
Alum, use of, as an adhesive, 41, 158.
Aluminium sulphate, toxicity of, to *Penicillium*, *P. brevicaule*, *P. candidum*, and *P. luteum*, 716.
— —, use of, to reduce hot water seed steeping injury, 280; with lime-sulphur, 113, 253.
Amaranthus, *Cercospora canescens* on, 130.
—, *Corticium solani* on, in Sierra Leone, 97.
— *retroflexus*, beet mosaic can infect, 90.
— —, *Cystopus bliti* on, in U.S.A., 75.
— —, *Sclerotinia sclerotiorum* on, in U.S.A., 313.
Ambrosia artemisiifolia, *Erysiphe cichoracearum* on, *Cicinnobolus cesatii* parasitizing, in U.S.A., 377.
Amelanchier alnifolia, *Gymnosporangium* (?) *corniculans* on, heterothallism in, 262.
Ammonia, stimulating effect of, on *Colletotrichum* (?) *gloeosporioides* on oranges, 366.
—, toxicity of, to *Phymatotrichum omnivorum*, 370.
—, use of, against *Penicillium digitatum* on orange and against storage rots of grapes, 366.
Ammonium bicarbonate, use of, against *Penicillium digitatum* on orange, 366.
— copper carbonate, use of, against *Cladosporium fulvum* on tomato, 211; against *Sphaerotheca mors-uvae* on gooseberry, 380.
— polysulphide, use of, against *Sphaerotheca mors-uvae* on gooseberry, 380.
— salts, toxicity of, to *Phymatotrichum omnivorum*, 370.
— —, see also Fertilizers.
Ammophila arundinacea, *Puccinia ammophilae* on, in France, 722.
Amoebae in *Apium nodiflorum* in England, 795.
Amygdalus communis, see Almond.
— *persica*, see Peach.
Ananas sativus, see Pineapple.
Anchusa officinalis, *Puccinia secalina* on, in Bulgaria, 475.
Andromeda japonica, *Armillaria mellea* on, in U.S.A., 411.
Andropogon australis, *Phytomonas rubrilineans* can infect, 473.
— *halepensis*, *Bacterium holci* on, in Bulgaria, 364.
— —, *Hendersonia crastophila* on, in Spain, 675.

[*Andropogon halepensis*], *Phyllosticta halepensis* on, in Spain, 329.
— —, *Phytomonas rubrilineans* can infect, 473.
— *sorghum*, see Sorghum.
— — var. *sudanensis*, see Sudan grass.
— — var. *technicus*, *Bacterium holci* on, in Bulgaria, 364.
Anemone, alloiophylly of, in Germany, 256.
—, *Puccinia pruni-spinosae* on, in England, 559; plum eradication against, 559.
— *coronaria*, *Puccinia pruni-spinosae* on, in U.S.A., 249.
— —, *Tuburcinia antipolitana* can infect, 95.
— *ranunculoides*, *Puccinia pruni-spinosae* on, in Bulgaria, 745.
Aniline dyes, see Dyes, aniline.
Anise (*Pimpinella anisum*), *Cercospora malkoffii*, *Plasmopara nivea*, and *Puccinia pimpinellae* on, in Russia, 73.
Anjou scald of pear in U.S.A., 57.
Ansbacher grain dust, use of, against *Ustilago avenae* and *U. kolleri* on oats, 634.
— -Siegle No. 14, use of, against *Gibberella moniliformis* on cotton, 430.
Antennella citrina on orange in Japan, 330.
Antestia, transmission of *Nematospora coryli* on coffee by, in Uganda, 353.
Anthracene oil, use of, against fruit diseases in France, 247, 655.
Anthyllis vulneraria, *Sclerotinia trifoliorum* on, in Denmark, 768.
Antinonnin, use of, against *Merulius lacrymans* and *Poria vaporaria* on timber, 84.
Antirrhinum majus, diseases of, in U.S.A., 649.
— —, hereditary disease of, induced by irradiation, 627.
— —, *Phyllosticta antirrhini* on, in Bulgaria, 745.
— —, *Pythium* (?) *artotrogus* on, in S. Africa, 331.
— —, *Septoria antirrhini* on, in Spain, 329.
Ants, *Cordyceps sherringii* on, (?) an immature stage of *C. lloydii*, 179.
Apate monacha, (?) *Spicaria* on, in the Ivory Coast, 241.
Aphananthe aspera, (?) *Fomes ulmarius* on, in Japan, 614.
Aphanomyces on oats in Holland, 127.
— *euteiches* on peas, factors affecting, 626; occurrence in England, 623; in Jamaica, 26; in U.S.A., 626.
— *levis* on beet in Germany, 559.
Aphelenchus fragariae on strawberry in U.S.A., 380.
Aphids, attempts to detect potato mosaic, leaf roll, and stipple-streak infections in, 68.
—, *Cephalosporium* (*Acrostalagmus*) *aphidicola* and *Gonatorrhodiella coccorum* on, 179.
—, transmission of potato virus *y* by, 394; of vine mosaic by, in Czechoslovakia, 280; of yellow dwarf of onion by, in U.S.A., 760.
Aphis laburni as vector of groundnut rosette in the Gambia, 697.
— *maidis*, transmission of yellow dwarf of onion by, in U.S.A., 557.
— *rumicis*, transmission of beet mosaic by, in the Ukraine, 90; of onion yellow dwarf by, in U.S.A., 557; of spinach yellows by, in Czecho-Slovakia, 258.
— *sacchari*, *Cladosporium* and *Empusa fresenii* on, in the Philippines, 640.
— *spireae*, transmission of witches' broom of *Holodiscus discolor* by, in U.S.A., 110.
Apium nodiflorum, amoebae in, in England, 795.
— *graveolens* and its var. *rapaceum*, see Celery.
Aplanobacter insidiosum on lucerne, breeding against, 499; effect of, on composition of the host, 787; factors affecting, 787; histological effects of, 787; occurrence in U.S.A., 224, 499, 787; study on, 787; varietal susceptibility to, 224.
— — on *Melilotus alba* in U.S.A., 787.
— *michiganense* on tomato, control, 483; occurrence in Germany, 483; (?) in Holland, 767; (?) in Mexico, 514; in U.S.A., 210, 224; study on, 210.
— *stewarti* on maize in U.S.A., 446, 560.
Aplopappus heterophyllus, *Phymatotrichum omnivorum* on, in U.S.A., 370.
Apocynum venetum, *Fusarium* and *Melampsora apocyni* on, in Russian Central Asia, 182.
Apoplexy of apricot in France, 791.
Aposphaeria petersii and *A. pinea* on timber in Russia, 616.
Apparatus for detecting mercury on treated seed-grain, 361.
— for growing plants under controlled conditions, 392.
— for seed-grain disinfection with formalin vapour, 290.
—, see also Seed-dusting apparatus.
Apple (*Pyrus malus*), *Alternaria* on, in U.S.A., 656.
—, *Aspergillus* on, in U.S.A., 378.
—, *Bacillus amylovorus* on, control, 111, 184; invasion of tissues by, 497; legislation against, in Spain, 752; mode of infection by, 306; notes on, 160; occurrence (?) in Italy, 765; in New Zealand, 184; in U.S.A., 111, 160, 306; studies on, 184, 306; viability of, 306.
—, bacterium on, in U.S.A., 650.
—, *Bacterium rhizogenes* on, in U.S.A., 461, 561.
—, — *tumefaciens* on, control, 47; occurrence in England, 47; in Russia, 47; in U.S.A., 378, 461; stock susceptibility to, 47, 48; studies on, 47, 378, 461; varietal susceptibility to, 47; woolly knot type of, 378.
—, *Botrytis cinerea* on, in England, 657; (?) in U.S.A., 115.

[Apple, *Botrytis*] *mali* and *Cephalosporium carpogenum* on, in U.S.A., 309.
—, *Chaetomella* on, in U.S.A., 378.
—, chlorosis of, in U.S.A., 811.
—, *Cladosporium* on, in U.S.A., 656.
—, — *malorum* on, in U.S.A., 310.
—, *Clasterosporium* on, in U.S.A., 248.
—, *Colletotrichum circinans* can infect, 392.
—, cold storage of, review of work on, in England, 247.
—, *Coniothecium chomatosporum* on, in England, 51.
—, copper deficiency disease of, in S. Africa, 724.
—, *Cytospora* on, in Canada and U.S.A., 186.
—, — *calvillae* on, in Poland, 695.
—, — *capitata* on, in Bulgaria, 745.
—, *Cytosporina ludibunda* on, factors affecting, 52.
—, *Dematium* on, in U.S.A., 656.
—, *Diaporthe perniciosa* on, factors affecting, 52.
—, *Elsinoe piri* on, in Europe, 723; synonymy of, 724.
—, fungal decay of, in storage in England, 51.
—, *Fusarium* on, factors affecting, 52; occurrence in U.S.A., 656.
—, — *fructigenum* on, 52, 307: regarded as a var. of *F. lateritium*, 306.
—, — *lateritium* can infect, 307.
—, — (?) *putrefaciens* on, in the Caucasus, 53.
—, gas storage of, review of work on, in England, 247.
—, *Gloeodes pomigena* on, (?) a stage of *Leptothyrium pomi*, 657; control, 560; notes on, 21; occurrence (?) in England, 21; in Germany, 657; in U.S.A., 560; synonymy of, 657.
—, *Gloeosporium perennans* on, control, 51, 249; *Eriosoma lanigerum* in relation to, 248; factors affecting, 788; occurrence in Canada, 248; in U.S.A., 51, 656, 788; studies on, 248, 788.
—, *Glomerella cingulata* on, notes on, 313, 654; occurrence in U.S.A., 654.
—, *Gymnosporangium juniperi-virginianae* on, control, 412; legislation against, in Spain, 752; occurrence in U.S.A., 412.
—, *Leptothyrium pomi* on, in Germany, 657; *Gloeodes pomigena* (?) a stage of, 657.
— measles, attributed to a *Clasterosporium* in U.S.A., 248.
—, *Monilia* on, see *Sclerotinia* on.
—, *Mycosphaerella pomi* on, control, 355, 427; note on, 654; occurrence in U.S.A., 355, 427, 654.
—, *Nectria galligena* on, in Switzerland, 247.
—, *Neofabraea malicorticis* on, factors affecting, 788; legislation against, in Spain, 752; occurrence in Denmark, 768; in U.S.A., 788; study on, 788.
—, *Penicillium* on, in the Caucasus, 53; in U.S.A., 656.
[Apple, *Penicillium*] *expansum* on, in U.S.A., 658, 659.
—, — *glaucum* on, in the Caucasus, 53.
—, perennial canker of, in U.S.A., attributed to winter injury, 656.
—, *Phoma* on, in England, 51.
—, *Phomopsis coneglanensis* and *P. vexans* on, factors affecting, 52.
—, *Phyllosticta pirina* on, in Kenya, 159; in Tasmania, 114.
—, — *solitaria* on, control, 520, 587; legislation against, in the Argentine, 415; in Spain, 752; note on, 654; occurrence in U.S.A., 520, 583, 587, 654; studies on, 583.
—, *Physalospora cydoniae* on, in Tasmania, 114; in U.S.A., 560.
—, physiological breakdown of, in U.S.A., 53.
—, *Phytomonas melophthora* on, see *Pseudomonas melophthora* on.
—, *Phytophthora* on, in Italy, 765.
—, — *cactorum* on, in England, 111.
—, — *syringae* on, in England, 111.
—, *Podosphaera leucotricha* on, control, 519; factors affecting, 799; occurrence in Germany, 799; in New S. Wales, 519; in Russian Central Asia, 316.
—, *Podosporiella* on, in U.S.A., 378.
—, *Polyporus hispidus* on, in Bulgaria, 475.
—, *Pseudomonas melophthora* on, in U.S.A., 657.
—, *Pyrenochaeta* on, in U.S.A., 378.
—, *Rosellinia arcuata* on, in Ceylon, 223.
— scald, control, 658, 659; factors affecting, 54; occurrence in England, 659; in U.S.A., 53, 54, 658; varietal susceptibility to, 53, 54. (See also soft scald of.)
—, *Sclerotinia* on, in the Caucasus, 53.
—, — *fructigena* on, ascigerous stage of 310; note on, 53; occurrence in the Caucasus, 53; in Russia, 310; in Spain, 307.
—, soft scald of, in U.S.A., 53, 54. (See also scald of.)
—, *Sphaeropsis* on, in the Caucasus, 53.
—, *Sporormia* on, in U.S.A., 378.
—, *Sporotrichum carpogenum* on, in U.S.A., 309.
—, *Stemphylium maculans* on, in Switzerland, 694.
—, *Trichothecium roseum* on, in the Caucasus, 53.
—, *Venturia inaequalis* on, ascospore discharge of, 112, 308; control, 49, 50, 80, 112, 113, 114, 161, 185, 252, 307, 427, 520, 581, 582, 626, 694, 725, 726, 787, 788; factors affecting, 48, 799; legislation against, in England, 80; nature of resistance to, 48, 307; note on, 654; occurrence in Australia, 799; in Canada, 252, 308; in Denmark, 185; in England, 48, 49, 50, 80, 112, 113, 307, 725; in Germany, 559; in New S. Wales, 114, 185; in Norway, 49, 582; in Switzerland, 694; in Tasmania, 112, 307; in U.S.A., 161, 427, 461, 520, 581, 626, 654, 726, 787,

788 ; overwintering of, 49 ; phenology of, 50 ; shoot infection by, 725 ; spray warnings against, in U.S.A., 161, 726 ; strains of, 461 ; studies on, 48, 49, 50, 307 ; varietal resistance to, 49 ; viability of, 48.
[Apple], *Verticillium* on, in U.S.A., 378.
—, — *albo-atrum* on, in Bulgaria, 745.
—, watercore of, in U.S.A., 55.
—, winter injury of, in U.S.A., 656.
—, *Xylaria mali* on, in U.S.A., 284.
Apricot (*Prunus armeniaca*), *Alternaria* on, in France, 23.
—, apoplexy of, in France, 791.
—, *Armillaria mellea* on, in France, 791.
—, *Bacillus spongiosus* on, in Hungary, 222.
—, bacteria on, in France, 23.
—, bacterial gummosis of, in U.S.A., 311.
—, *Clasterosporium* on, in Switzerland, 187.
—, copper deficiency chlorosis of, in S. Africa, 724.
—, *Coryneum* on, in France, 23.
— die-back, control, 311 ; etiology of, 791, 792 ; occurrence in France, 23, 791 ; in S. Australia, 792 ; in Switzerland, 187 ; in Tasmania, 311 ; studies on, 187, 791.
—, *Fusarium* on, in France, 23 ; in Switzerland, 187.
—, *Leucostoma persoonii* can infect, 60.
—, *Monilia* on, see *Sclerotinia* on.
— mosaic in Czecho-Slovakia, 424.
—, *Nectria cinnabarina* on, in Tasmania, 311.
—, *Puccinia pruni-spinosae* can infect, 249.
—, *Sclerotinia* on, in Switzerland, 187.
—, — *cinerea* on, note on, 791 ; occurrence in England, 93 ; in France, 791 ; in Spain, 307.
—, — *sclerotiorum* on, in Queensland, 157.
—, *Valsa japonica* can infect, 60.
—, *Verticillium* on, in Switzerland, 187.
—, — *dahliae* can infect, 550 ; note on, 23 ; occurrence in France, 23, 792.
Arachis hypogaea, see Groundnut.
Arborol, use of, against *Bacterium tumefaciens* on *Salix americana*, 274.
Areca palm (*Areca catechu*), *Phytophthora arecae* on, in India, 158, 509.
Arenga saccharifera, *Ganoderma pseudoferreum* on, in Malaya, 402.
Arisaema triphyllum, *Uromyces caladii* on, parasitic action of, 391.
Armillaria mellea, control, 681.
— —, cultural studies on, 681.
— —, luminescence of, 337, 682.
— — on *Acer platanoides* and *Andromeda japonica* in U.S.A., 411.
— — on apricot in France, 791.
— — on birch in U.S.A., 337.
— — on box in U.S.A., 411.
— — on *Canna indica* in Great Britain, 376.
— — on *Chamaecyparis thyoides* in U.S.A., 140.
[*Armillaria mellea*] on citrus in U.S.A., 40.
(?) — — on coffee in Madagascar, 699.
— — on iris in England, 376.
— — on lime in Cyprus, 696.
— — on *Narcissus* in Great Britain, 376 ; in U.S.A., 786.
— — on pear in U.S.A., 40.
— — on *Pseudotsuga taxifolia* in Germany, 141.
— — on strawberry in U.S.A., 727.
— — on timber, action of, 343.
— — on walnut in France, 95.
— —, parasitism of, 681.
— —, resistance of, to extreme cold, 318.
— —, toxicity of various substances to, 681.
Arsenic as a constituent of Powell's solution, 146 ; of thanalith U, 85.
—, fixation of, in timber in relation to preservation, 217, 685.
— injury, 581.
— acid, factors affecting germination of seed-grain treated with, 773.
— —, toxicity of, to *Coniophora cerebella*, *Schizophyllum commune*, and other fungi, 84.
— pentoxide, use of, as a timber preservative, 217.
Arsenious oxide, use of, as a timber preservative in Australia, 617.
Artichoke (*Cynara scolymus*), *Ramularia cynarae* on, in Bulgaria, 745.
—, *Sclerotinia sclerotiorum* on, in U.S.A., 429.
—, virus disease of, in U.S.A., 162.
Artificial silk, *Penicillium*, *P. lilacinum*, *P. pinophilum*, *P. purpurogenum* var. *rubri sclerotium* on, action of, 717.
Artocarpus, *Fomes lamaoensis* on, in Java, 72.
Arum lily, see *Zantedeschia aethiopica*.
Arundinaria simoni, *Aithaloderma phyllostachydis* on, in Japan, 330.
Aschersonia philippinensis conidial stage of *Hypocrella philippinensis*, 455.
Ascidia mentula, *Bacterium tumefaciens* can infect, 227.
Asclepias, *Fusarium* on, in India, 158.
Ascochyta on soy-bean in Russian Central Asia, 316.
—, phenology of, in Austria, 799.
— *chlorospora* on almond, legislation against, in Spain, 752.
— *corticola* on lemon in New Zealand, 365.
— *fabae* on bean in England, 143.
— (?) *graminicola* on barley in Denmark, 768.
— *linicola* on flax in Russia, 647.
— *medicaginis* on lucerne in France, identity questioned, 654.
— —, see also *Phyllosticta medicaginis*.
— *pinodella* on peas, control, 17, 345 ; occurrence in New S. Wales, 222 ; in U.S.A., 17, 345.
— — on vetch in U.S.A., 345.
— *pisi* on *Onobrychis sativa* in Bulgaria, 475.

[*Ascochyta pisi*] on peas in England, 759; in France, 94; in New S. Wales, 222; varietal susceptibility to, 94.
— *rabiei* on *Cicer arietinum*, control, 347; occurrence in France, 23, 150, 344; in Spain, 347; *Phyllosticta rabiei* renamed, 150; study on, 150; varietal resistance to, 23, 344.
— *sojaecola* on soy-bean in Siberia, 88.
(?) — *tini* on *Viburnum davidi* in France, 651.
— *trifolii* synonym of *Stagonosporopsis trifolii*, 654.
Ascomycetes, classification of, 606.
Ash (*Fraxinus*), bacterial canker of, in Holland, Scotland, and Switzerland, 12.
—, *Nectria galligena* on, in Norway, 136.
—, — — var. *major* on, in Holland, 12.
—, *Pseudomonas savastanoi fraxini* on, (?) 12; in Austria, 682.
—, *Venturia fraxini* on, in Norway, 136.
Asparagus, *Mucor abundans*, *M. circinelloides*, and *M. hiemalis* can infect, 554.
—, *Puccinia asparagi* on, in Germany, 92.
Aspen (*Populus tremula*), *Venturia tremulae* on, in Norway, 136.
Aspergillus, biochemistry of, 119.
— in butter churns in U.S.A., 181.
— in soil in U.S.A., 264.
—, key for identification of, 483.
— on apple in U.S.A., 378.
— on bread in U.S.A., 710.
— on mushrooms in Austria, 493.
— on timber in S. Africa, 684.
—, selective culture medium for, 643.
— *candidus* on cacao in the Dominican Republic, 30.
— *chevalieri* on coco-nut (copra) in England, 175.
— *cinnamonensis* on coco-nut (copra) in Malaya, 636.
— *flavipes*, decomposition of straw by, 3.
— *flavus* on bees, pathogenicity of, 180.
— — on cacao in the Dominican Republic, 30; in Nigeria, 285.
— — on coco-nut (copra) in England, 175.
— — on locusts in the Gold Coast, 696.
— — *-oryzae* on coco-nut (copra) in Malaya, 636.
— *fulvus* on the silkworm, 179.
— *fumigatus*, chemotherapy of mycoses caused by, 715.
— —, decomposition of hemicelluloses by, 263; of straw by, 3.
— — on cacao in the Dominican Republic, 30; in Nigeria, 285.
— — on man in the Argentine, 43; in France, 181.
— *glaucus* on cacao in the Dominican Republic, 30; in Nigeria, 285.
— — on coco-nut (copra) in Malaya, 636.
— —, resistance of, to extreme temperatures, 318.
— *nidulans*, decomposition of straw by, 3.
— — on cacao in the Dominican Republic, 30.
— *niger*, action of luminous rays on, 737.
[*Aspergillus niger*], decomposition of hemicelluloses by, 263; of straw by, 3.
— — on cacao in the Dominican Republic, 30.
— — on coco-nut (copra) in England, 175; in Malaya, 636.
— — on cotton fabrics in relation to diamond spot, 241.
— — on date palm in U.S.A., 572.
— — on locusts in Russia, 42.
— —, resistance of, to extreme temperatures, 318.
— *oryzae* on man in Cyrenaica, 458.
— *sydowi* on cacao in Nigeria, 285.
— *tamarii* on cacao in the Dominican Republic, 30; in Nigeria, 285.
— — on coco-nut (copra) in England, 175; in Malaya, 636.
— *terreus*, decomposition of straw by, 3.
— — on cotton fabrics in relation to diamond spot, 241.
— *versicolor*, decomposition of straw by, 3.
— —, higher paraffins as a source of carbon for, 589.
Asphaltum, use of, as a wound dressing, 186, 325.
Asphodelus, *Puccinia asphodeli* on, parasitic action of, 391.
Aster, tomato spotted wilt can infect, 549.
—, see also Michaelmas daisy.
Aster, China (*Callistephus chinensis*), *Corticium centrifugum* with imperfect stage resembling *Sclerotium rolfsii* on, in Italy, 405, 746, 748; imperfect stage named *S. centrifugum*, 749.
—, —, diseases of, in U.S.A., 649.
—, —, *Fusarium* on, in Czecho-Slovakia, 624; in Germany, 718.
—, —, — *conglutinans* var. *callistephi* on, in Canada, 244; in Czecho-Slovakia, 624; in Italy, 375; in U.S.A., 302; varietal resistance to, 244, 302.
—, —, — *pyrochroum* on, in Czecho-Slovakia, 624.
—, —, *Phyllosticta asteris* on, in Italy, 375.
—, —, *Pythium ultimum* on, in S. Africa, 331.
—, —, *Sclerotium centrifugum* on, in Italy, 405, 746, 748; sclerotial stage of *Corticium centrifugum* named, 749.
—, —, — *rolfsii* on, see *S. centrifugum* on.
—, —, yellows of, in U.S.A., 302; (?) affecting *Erigeron canadensis* in U.S.A., 521.
Asterina cypressina on *Chamaecyparis thyoides* in U.S.A., 140.
Asterineae, studies on the, 404.
Asterocystis radicis on flax in Belgium, 182.
Asteroma pomigena synonym of *Gloeodes pomigena*, 657.
Astycus, *Beauveria bassiana* on, 179.
Athyrium acrostichoides, *Uredinopsis intermedia* on, in Japan, 813.
— *filix-foemina* var. *melanolepis*, *Uredinopsis athyrii* on, in Japan, 813.
— *pterorachis*, *Uredinopsis intermedia* on, in Japan, 813.

Atropa belladonna, *Didymella lycopersici* can infect, 809.
Attacus ricini, *Sterigmatocystis ferruginea* on, 179.
Aucuba mosaic of potato, cytology of, 532; note on, 256; occurrence in Belgium, 121; in Ireland, 532; transmission of, by true seed, 200.
— — of tomato, effect of, on metabolism, 679; intracellular bodies in, 335; movement of virus in, 207; nature of virus of, 678; occurrence in England, 207, 408, 678, 679, 754; (?) in Trinidad, 610; production of local lesions by, on *Nicotiana* spp., 408; properties of virus of, 679, 735; studies on, 207, 335, 754; transmission of, to *Datura stramonium*, 754; to *Hyoscyamus niger*, 335; to *Nicotiana acuminata* and *N. glutinosa*, 754; to *Solanum nigrum*, *S. nodiflorum*, and tobacco, 335.
Avena elatior, *Claviceps purpurea* and *Ustilago perennans* in seed samples of, in Denmark, 304.
— *fatua*, *Puccinia graminis* on, in S. Africa, 231.
— spp., see Oats.
Avocado pear (*Persea gratissima*), die-back of, and *Phytophthora cambivora* on, in S. Africa, 331.
— —, *Rosellinia* and *Sphaceloma* on, in Jamaica, 625.
— —, sun blotch of, in U.S.A., 314.
Azurin, use of, against *Pestalozzia guepini* on *Rhododendron indicum*, 650.

B.P.R., use of, against *Bacterium pruni* on peach in U.S.A., 355.
Bacillus amylovorus can infect *Chaenomeles lagenaria*, *Photinia villosa*, and strawberry, 306.
— —, cultural studies on, 306.
— — in soil in U.S.A., 723.
— — on apple, control, 111, 184; invasion of tissues by, 497; legislation against, in Spain, 752; mode of infection by, 306; notes on, 160; occurrence (?) in Italy, 765; in New Zealand, 184; in U.S.A., 111, 160, 306; study on, 184; viability of, 306.
— — on *Crataegus* in New Zealand, 184.
— — on *Crataegus oxyacantha* in U.S.A., 305.
— — on loquat in France, (?) 305, 729; in Italy, 117.
— — on pear, control, 184; leafhoppers in relation to, 306; legislation against, in the British Isles, 543; in Spain, 752; mode of infection by, 306; occurrence (?) in Italy, 281; in New Zealand, 184; in U.S.A., 111, 160, 306, 497; strains of, 160; studies on, 184, 306; varietal resistance to, 497.
— — on quince, legislation against, in Spain, 752; occurrence in U.S.A., 792.
— — on rose in U.S.A., 305.
— —, *Pseudomonas utiformica* arising as a contaminant in a culture of, 378.
— —, selective medium for, 723.
[*Bacillus amylovorus*], toxicity of merthiolate and metaphen to, 428.
— *apiovorus* synonym of *B. carotovorus*, 259.
— (?) *aroideae* can infect carrot and potato, 209.
— — on chilli in U.S.A., 803.
— — on Chinese cabbage, melon, and radish in Japan, 700.
— — on tobacco in Sumatra, 478; (?) in U.S.A., 209.
— — on tomato in Japan, 700; (?) in Trinidad, 610.
— (?) — on turnip in India, 344.
— — on *Zinnia elegans* in Japan, 700.
— —, serological study on, 700.
— —, strains of, 700.
— *baccarinii* on vine in Italy, 281.
— *carotovorus*, *B. apiovorus*, *B. oleraceae*, *B. omnivorus*, and *B. phytophthorus* synonyms of, 259.
— —, *Bacterium dissolvens* similar to, 446.
— — on chilli in U.S.A., 803.
— (?) — on onion in Japan, 700.
(?) — — on parsley in Denmark, 768.
— — on potato in Norway, 670.
— —, serological study on, 700.
— *coli* on coco-nut, bud rot attributed to, 41.
— — *-capsici* can infect tomato, 673.
— — — on chilli in Italy, 673.
— *fluorescens liquefaciens* and *B. f. non-liquefaciens*, plant pathogens of the green fluorescent group may be strains of, 18.
— *lathyri*, note on, 679.
— — on bean in England, 143. (See also *Pseudomonas seminum* on.)
— —, tomato streak attributed to, in Germany, 10.
— *mangiferae* on mango in S. Africa, 698, 793; in Tanganyika, 698.
— *megatherium*, resistance of, to extreme temperatures, 318.
— (?) *melonis* on turnip in India, 344.
— *oleraceae* and *B. omnivorus* synonyms of *B. carotovorus*, 259.
— *papaveri* on opium poppy, *Papaver alpinum*, and *P. orientale* in Bulgaria, 745.
— *papayae* on papaw in Java and the Molucca Islands, 193.
— *phytophthorus* on potato, control, 259; effect of, on acidity of the tuber, 122; on sprouting, 261; losses caused by, 258; occurrence in Canada, 258; in Czecho-Slovakia, 261; in England, 122; in Germany, 65, 559; in U.S.A., 258; *Phorbia cilicrura* in relation to, 259; synonymy of, 259; transmission of, 259.
— —, production of smooth and rough colonies of, 226.
— — synonym of *B. carotovorus*, 259.
— *radicicola* on *Podocarpus* in S. Africa, 258, 592.
— *radiobacter*, *Bacterium tumefaciens* possibly a mutant or form of, 357.
— — can infect *Chrysanthemum frutescens*, 357.

[*Bacillus radiobacter*] on cowpea in U.S.A., 357.
— *sacchari* on sugar-cane in the Philippines, 203.
— *sorghi*, *Bacterium holci* may be mistaken for, in S. Europe, 364.
(?) — — on sorghum in the Gold Coast, 696.
— — on Sudan grass in Hungary, 222.
— *spongiosus* on apricot in Hungary, 222.
— *subtilis*, resistance of, to extreme temperatures, 318.
— *tracheiphilus* on cucumber in U.S.A., 428.
Bacteria, antibosis of, to smuts and other fungi, 98; to *Ustilago zeae* on maize in U.S.A., 103.
— on apricot in France, 23.
— on barley seed in Canada, 293.
— on coco-nut (copra) in Malaya, 636.
— on cotton bolls, 176.
— on oleander in Italy, 65.
— on sugar-cane in Indo-China, 432.
(?) Bacterial bud rot of coco-nut in St. Lucia, 27.
— canker of ash in Holland, Scotland, and Switzerland, 12.
— 'centre rot' of tomato in U.S.A., 27.
— decay of stored vegetables in Germany, 489.
— disease of banana in Indo-China, 432.
— — of bean in Denmark, 768.
(?) — — of cassava in the Belgian Congo, 20.
(?) — — of maize in Canada, 233.
— — of pear in England, 22.
— — of *Salix* in Holland, 411, 551.
— diseases of plants, Russian booklet on, 29.
— —, phenology of, in Austria, 799.
— fruit spot of cherry in England, 22.
— gummosis of apricot and plum in U.S.A., 311.
— leaf spot of sunflower in Russia, 282.
— root nodules of *Casuarina equisetifolia* in India, 797.
— rot of plantain in Ceylon, 223.
— — of potato in India, 126; legislation against, in Portugal, 272.
— — of tomato in Algeria and France, 809.
— wilt of *Melilotus alba* in U.S.A., 428.
Bacteriosis of cotton in Russia, 41; in Russian Central Asia, 316.
Bacterium on apple in U.S.A., 656.
— on potato in Rhodesia, 67.
— on sorghum in U.S.A., 507.
— *albilineans* on sugar-cane, control, 328; notes on, 327, 403, 539; occurrence in Hawaii, 328, 539; in Mauritius, 127, 495, 604; in the Philippines, 203; in Queensland, 327; varietal susceptibility to, 604.
(?) — *uptatum* on potato in England, 701.
— *atrofaciens* on wheat (?) in Italy, 544; in S. Africa, 227.
— *cubonianum* synonym of *Bact. mori*, 756.
— *dissolvens* on maize in U.S.A., 446.
[*Bacterium*] *erivanse* on cotton in Russia, 41.
— *flaccumfaciens* on bean in U.S.A., 618.
— *fluorescens*, effect of filtrate of, on resistance of wheat to *Helminthosporium sativum*, 530.
— *glycineum* on soy-bean in New S. Wales, 222.
— —, relationships of, 18.
— *holci* can infect maize, 364.
— — on *Andropogon halepensis*, *A. sorghum* var. *technicus*, and Sudan grass in Bulgaria, 364.
— *iridicola* on iris in Japan, 108.
— *juglandis*, carbohydrate fermentation by, 772.
— — on walnut, notes on, 79, 338; occurrence in England, 79, 338; (?) in France, 339; in Italy, 338, 766; in various countries, 338.
(?) — *lacrymans* on cucumber in Germany, 92.
— —, relationships of, 18.
— *löhnisi* on cotton in Russia, 41.
— *lycopersici* on tomato in Esthonia, 25.
— — *vitiati* on tomato in Poland, 482.
— *maculicola* can infect Brussels sprouts and cauliflower, 146.
— — on cabbage in Finland, 146.
— — on cauliflower in Bulgaria, 745.
— *malvacearum*, carbohydrate fermentation by, 772.
— —, cell fusion and reproduction in, 712.
— — on cotton, breeding against, 699; control, 454, 638; factors affecting, 297, 354, 451; occurrence in Egypt, 176; in Guatemala, 431; in Rhodesia, 638; in Russia, 41; in Russian Central Asia, 316; in St. Vincent, 699; in the Sudan, 176, 450, 451; in Trinidad, 176; in Uganda, 353, 451; in U.S.A., 298, 454, 511; serological studies on, 176, 298; studies on, 297, 353, 451; systemic infection by, 511; not accepted, 354; varietal resistance to, 451, 699.
(?) — *marginale* on lettuce in England, 143, 701.
— *marginatum* on gladiolus, control, 356, 428; occurrence (?) in Australia and Canada, 544; in Denmark, 768; (?) in Germany, Great Britain, Holland, and New Zealand, 544; in U.S.A., 356, 428.
— *medicaginis* on beans in New Zealand, 418.
— —, relationships of, 18.
— — var. *phaseolicola* on beans, control, 555, 618, 687, 759; histological effects of, 618; note on, 759; occurrence in Bulgaria, 745; in England, 143, 759; in Europe, 418; in France, 344; in Germany, 687; in Holland, 96; in Queensland, 555; in U.S.A., 418, 618; (?) in Western Australia, 618; studies on, 143, 344; varietal susceptibility to, 418, 759.
— — — —, relationships of, 18, 418.
— (?) *mori* on cotton in Rhodesia, 638.
— — on mulberry in Bulgaria, 475; in

Russian Central Asia, 756 ; *Bact. cubenianum* synonym of, 756.
[*Bacterium*] *nectarophilum*, relationships of, 18.
— *papavericola* can infect *Papaver orientale*, 73.
— — on opium poppy in Bulgaria (?), 73, 475.
— *pelargonii* on *Pelargonium* in Holland, 767 ; (?) in U.S.A., 650.
— *phaseoli*, carbohydrate fermentation by, 772.
— — on bean, histological effects of, 618 ; longevity of, 224 ; occurrence in Holland, 222 ; in New S. Wales, 222 ; in U.S.A., 224, 618 ; varietal susceptibility to, 222, 224.
— — var. *fuscans*, carbohydrate fermentation by, 772.
— — — *sojense*, carbohydrate fermentation by, 772.
— — — — — on soy-bean in New S. Wales, 222 ; in U.S.A., 18.
— *pisi*, see *Pseudomonas pisi*.
— *pruni* on peach, control, 355, 520, 525, 584, 660 ; occurrence in U.S.A., 355, 520, 525, 583, 660 ; study on, 584.
— —, toxicity of merthiolate and metaphen to, 428.
— *pseudozoogloeae* on tobacco in Italy, 677, 766.
— *radiciperda* on clover, lentils, and lucerne in Russia, 652.
(?) — — on *Onobrychis viciaefolia* in Russia, 653.
— *rathayi* on *Dactylis glomerata* in Denmark, 304.
— *rhizogenes* on apple in U.S.A., 461, 561.
— *rubefaciens* on potato in England, 122, 320. (See also Sprain of.)
(?) — *salicis* on *Salix* in Holland, 411, 551.
— *sepedonicum* on potato in U.S.A., 670.
— *sojae* on soy-bean in Siberia, 315.
— *solanacearum* on chilli in Porto Rico, 29 ; in S. Africa, 123.
— — on *Chrysanthemum sinense* in Sumatra, 477.
— — on *Datura stramonium* in S. Africa, 123.
— — on eggplant in Porto Rico, 29 ; in S. Africa, 123.
— — on *Gerbera* in Sumatra, 477.
— — on groundnut in S. Africa, 123 ; in U.S.A., 621.
— — on *Gynura* in Sumatra, 477.
— — on *Physalis minima* in S. Africa, 123.
(?) — — on plantain in Ceylon, 223.
— — on potato in Porto Rico, 29 ; in S. Africa, 122.
— — on *Solanum nigrum* and *S. torvum* in Porto Rico, 29.
— — on tobacco, breeding against, 477 ; notes on, 332 ; occurrence in Ceylon, 223 ; in Malaya, 769 ; in S. Africa, 123 ; in Sumatra, 332, 477.
— — on tomato, control, 610, 808 ; factors affecting, 808 ; notes on, 123, 610, 808 ; occurrence in Algeria, 808 ; in Porto Rico, 29 ; in S. Africa, 123 ; in Trinidad, 609 ; varietal susceptibility to, 29.
[*Bacterium solanacearum*] on *Zinnia elegans* in Porto Rico, 29.
— —, strain non-pathogenic to tobacco in Porto Rico, 29.
— (?) *tabacum* can infect clover and tomato, 77.
— (?) — on *Nicotiana rustica* in Russia, 77.
— — on tobacco, control, 497, 807 ; factors affecting, 77 ; histological effects of, 480 ; occurrence in France, 807 ; (?) in Russia, 77 ; in U.S.A., 497 ; studies on, 76, 807.
— *translucens* var. *undulosum* can infect *Bromus inermis*, *Hordeum jubatum*, and oats, 434.
— — — — — on barley and rye in U.S.A., 434.
— — — — — on wheat, control, 286 ; occurrence in Kenya, 163 ; in Russia, 286 ; in U.S.A., 434 ; studies on, 286, 434.
— *trifoliorum* on bean in England, 18 ; relationships of, 18.
— *tumefaciens* can infect *Ascidia mentula*, 227 ; *Nereis diversicolor*, 499 ; *Sipunculus nudus*, 227.
— —, gall formation by, 30, 378, 461, 562.
— — in relation to cancer, 358, 562.
— —, life-cycle of, 357.
— — on apple, control, 47 ; occurrence in England, 47 ; in Russia, 47 ; in U.S.A., 378, 461 ; stock susceptibility to, 47, 48 ; studies on, 47, 378, 461 ; varietal susceptibility to, 47 ; woolly knot type of, 378.
— — on blackberry in England, 423.
— — on chrysanthemum in Germany, 785.
— — on fruit trees in Germany, 655.
— — on loganberry in England, 423.
— — on pear in Russia, 47.
— — on pecan in U.S.A., 213.
— — on *Pelargonium*, factors affecting, 358.
— — on raspberry in U.S.A., 428.
— — on rose in Poland, 459.
— — on *Salix* in Czecho-Slovakia, 157.
— — on *Salix americana* in Czecho-Slovakia, 274 ; *Cryptorrhynchus lapathi* in relation to, 274.
— — on vine in Germany, 655 ; in Russian Central Asia, 316.
— — possibly a mutant or form of *Bacillus radiobacter*, 357.
— —, production of smooth and rough colonies of, 226.
— —, 'star' formation by, 357.
— —, toxicity of merthiolate and metaphen to, 428.
— *vascularum*, carbohydrate fermentation by, 772.
— — on sugar-cane, breeding against, 541 ; control, 204, 804 ; diagnosis of, 542 ; effect of, on yield, 75 ; occur-

rence in Australia, 542; in Barbados, 75, 804; in Mauritius, 127, 495; in New S. Wales, 541; in Porto Rico, 542; in Queensland, 204, 827; in St. Lucia, 698; strains of, 542; varietal resistance to, 75, 327, 541, 698, 804.
[*Bacterium*] *vesicatorium*, carbohydrate fermentation by, 772.
— — on chilli in U.S.A., 803, 804.
— — on tomato in U.S.A., 355.
— *vitians*, carbohydrate fermentation by, 772.
(?) — — on lettuce in England, 144.
— *xylinum*, a component of the 'tea fungus' of Java, 548, 676.
'Bakanae' disease of rice, see *Gibberella fujikuroi*.
Bamboo, see *Phyllostachys nigra*.
Banana (*Musa* spp.), bacterial disease of, in Indo-China, 432.
—, *Botryodiplodia theobromae* on, in Martinique, 463; in Trinidad, 190.
—, *Botrytis cinerea* on, in Palestine, 728.
—, bunchy top of, legislation against, in Egypt, 752.
—, *Cephalosporium* on, in the Canary Islands, 281.
—, *Ceratostomella paradoxa* on, legislation against, in the Argentine, 415; in Spain, 752; note on, 189; occurrence in Martinique, 463.
—, chlorosis of, in Jamaica, 25.
—, *Clitocybe tabescens* on, in U.S.A., 382.
—, *Fusarium* on, legislation against, in Spain, 752; occurrence in Brazil, 728; in England (on S. American fruit), 189; in Italian Somaliland, 765; study on, 189.
—, — *oxysporum cubense* on, breeding against, 25, 383, 625; control, 25, 80, 585, 625; infection of the rhizome by, 312; legislation against, in Jamaica, 80; notes on, 61, 624; occurrence in British Guiana, 26; in the Canary Islands, 281; in Jamaica, 25, 61, 80, 585, 624; in Martinique, 463; (?) in Mauritius, 496; in Mexico, 463; in Trinidad, 383; varietal resistance to, 25, 383, 463.
—, *Gibberella moniliformis* on, in Uganda, 353.
—, *Gloeosporium musarum* on, control, 383; occurrence in Brazil, 728; in Ceylon, 382; in England (on S. American fruit), 189; in India, 382; in Italian Somaliland, 765; in Martinique, 463; in Trinidad, 382, 383; studies on, 189, 382, 383.
—, *Glomerella cingulata* on, in Trinidad, 382.
—, heart rot of, legislation against, in New S. Wales, 416; occurrence in New S. Wales, 416; in Queensland, 157; transmission of, by *Pentalonia nigronervosa*, 157.
—, *Helminthosporium gibberosporum* on, in Italian Somaliland, 384.
—, — *torulosum* on, in Italian Somaliland, 765; in Jamaica, 25; in Trinidad, 464; study on, 464; varietal susceptibility to, 464.
[Banana], infectious chlorosis of, see heart rot of.
—, leaf fall of, in New S. Wales, 585.
—, *Marasmius stenophyllus* on, in Jamaica, 25; in Sierra Leone, 97.
—, *Nigrospora oryzae* on, in England (on S. American fruit), 189.
—, *Pestalozzia* on, in England (on S. American Fruit), 190.
—, (?) *Phytophthora* on, in Italian Somaliland, 765.
—, 'pin-head' black spot of, in Jamaica, 625.
—, *Piricularia grisea* on, in Brazil, 728.
—, (?) *Pythium* on, in Italian Somaliland, 765.
—, *Sclerotinia sclerotiorum* on, in Palestine, 173.
—, *Sphaerostilbe musarum* on, in Jamaica, 25.
—, squirter disease of, in Queensland, 794.
—, *Stachylidium theobromae* on, in Italian Somaliland, 765; in Trinidad, 312.
— wastage in England (in S. American fruit), 189; in Trinidad, 383.
Barberry (*Berberis*). *Phytomonas berberidis* on, in U.S.A., 109.
—, *Puccinia graminis* on, hybridization of, 437; legislation against, in U.S.A., 80, 352; occurrence in Canada, 232; in Esthonia, 24; in Germany, 31; in U.S.A., 437, 628; physiologic specialization in, 232, 437, 628; specific and varietal resistance to, 24, 352, 628; study on, 437; transmission of, from oats, rye, and wheat in S. Africa, 164.
—, — *mirabilissima* on, in Czecho-Slovakia, England, France, Germany, and Switzerland, 581.
Barley (*Hordeum*), *Alternaria* on, in Canada, 293.
—, *Ascochyta* (?) *graminicola* on, in Denmark, 768.
—, bacteria on seed of, in Canada, 293.
—, *Bacterium translucens* var. *undulosum* on, in U.S.A., 434.
—, *Calonectria graminicola* on, in Germany, 444.
—, *Erysiphe graminis* on, in Czecho-Slovakia, 157; in Germany, 102.
—, *Fusarium* on, in Canada, 293, 294.
—, — *culmorum* on, in England, 632; in Germany, 444.
—, — *scirpi* vars. *nigrans* and *pallens* on, in Great Britain, 504.
—, *Gibberella saubinetii* on, 293.
—, grey speck of, see manganese deficiency disease of.
—, *Helminthosporium* on, in Canada, 293, 294.
—, — *gramineum* on, control, 506, 560, 568, 707, 766, 775; losses caused by, 560; occurrence in Canada, 445; in Germany, 37, 445, 559, 707, 775; in Holland, 766; in New Zealand, 506; in Sweden, 568; in U.S.A., 445, 560; physiologic specialization in, 445;

varietal resistance to, 560. (See also *Pleospora graminea*.)
[Barley, *Helminthosporium*] *nodulosum* can infect, 426.
—, — *oryzae* on, in Russian Central Asia, 315.
—, — *sativum* on, control, 632; occurrence in England, 632; in Kenya, 159; in Peru, 225.
—, — *teres* on, in Germany, 37; in India, 426.
—, *Heterosporium* on, in Canada, 293.
—, magnesium deficiency disease of, in Germany, 101.
—, manganese deficiency disease of, in Denmark, 768; in S. Australia, 568.
—, *Mucor* on, in Canada, 294.
—, *Ophiobolus herpotrichus* on, in Czecho-Slovakia, 157.
—, *Pleospora graminea* on, in Denmark, 162. (See also *Helminthosporium gramineum*.)
—, *Puccinia anomala* on, artificial infection of, in resistance tests, 168; factors affecting, 31, 36, 98; occurrence in Canada, 293, 294; in Germany, 31, 36, 98; physiologic forms of, 36, 294; varietal resistance to, 37, 294.
—, — *glumarum* on, in Germany, 31.
—, — *graminis* on, in the Argentine, 358; in Brazil, 358; in Canada, 293; in Germany, 31; in S. Africa, 164, 231; in Uruguay, 358; physiologic forms of, 231.
—, *Pythium* can infect, 294.
—, — *arrhenomanes* var. *canadensis* can infect, 435.
—, reclamation disease of, in Denmark, 767.
—, *Rhizopus* on, in Canada, 294.
—, *Rhynchosporium secalis* on, in Germany, 37.
—, *Septoria passerini* on, in Bulgaria, 745.
—, *Ustilago hordei* on, control, 505, 560, 776; losses caused by, 560; occurrence in Canada, 293; in Germany, 65; in New Zealand, 505, 776; in Queensland, 505; in U.S.A., 560; seed certification against, in Germany, 65; varietal resistance to, 560.
—, — *nuda* on, control, 505, 567, 633; factors affecting, 165, 567; genetics of resistance to, 666, 710, 776; losses caused by, 633, 776; occurrence in Canada, 293; in Germany, 65, 633, 666, 710, 776; in New Zealand, 505; in U.S.A., 165, 567; physiologic forms of, 710; seed certification against, in Germany, 65; studies on, 165, 567, 710, 776; types of infection by, 567; varietal resistance to, 666, 710, 776.
Basidiomycetes on beech in Russia, 612.
— on pine and spruce forming mycorrhiza in U.S.A., 527.
Basilite, toxicity of, to wood-destroying fungi, 14.
Bayer dust, use of, against *Sclerotium rolfsii* on cotton, 298.
'Bean' spraying apparatus, 196.
Beans, *Ascochyta fabae* on, in England, 143.
—, *Bacillus lathyri* on, in England, 143. (See also *Pseudomonas seminum* on.)
—, bacterial disease of, in Denmark, 768.
—, *Bacterium flaccumfaciens* on, in U.S.A., 618.
—, — *medicaginis* on, in New Zealand, 418.
—, — — var. *phaseolicola* on, control, 555, 618, 687, 759; histological effects of, 618; note on, 759; occurrence in Bulgaria, 745; in England, 143, 759; in Europe, 418; in France, 344; in Germany, 687; in Holland, 96; in Queensland, 555; in U.S.A., 418, 618; (?) in Western Australia, 618; studies on, 143, 344; varietal susceptibility to, 418, 759.
—, — *phaseoli* on, histological effects of, 618; longevity of, 224; occurrence in Hungary, 222; in New S. Wales, 222; in U.S.A., 224, 618; varietal susceptibility to, 222, 224.
—, — *trifoliorum* on, in England, 18; relationships of, 18.
—, beet curly top virus affecting, in U.S.A., 219, 556.
—, *Botrytis cinerea* on, artificial immunization against, 593, 798; control, 347; occurrence in Czecho-Slovakia, 624; in England, 143; in Spain, 347; studies on, 347, 798.
—, — *fabae* on, in Spain, 346.
—, *Cercospora canescens* on, 130; in Guatemala, 431.
—, — *cruenta* on, 130.
—, *Colletotrichum lindemuthianum* on, control, 687; factors affecting, 278; genetics of resistance to, 618, 666; occurrence in Germany, 277, 618, 666, 687; physiologic forms of, 277, 618; studies on, 277, 618; varietal susceptibility to, 278, 618.
—, *Corticium solani* on, in the Gold Coast, 696.
—, *Erysiphe polygoni* on, control, 28, 346; notes on, 19; occurrence in Bermuda, 97; in U.S.A., 19, 28, (?) 346; specialization in, 19; study on, 346; varietal resistance to, 346.
—, *Fusarium* can infect, 369.
—, — *culmorum* on, in Bulgaria, 745.
—, — *martii phaseoli* on, factors affecting, 556; occurrence in England, 143, 759; in U.S.A., 556; varietal resistance to, 143, 759.
—, — *vasinfectum* on, in Czecho-Slovakia, 624.
—, *Isariopsis griseola* on, in Guatemala, 431.
—, *Macrophomina phaseoli* on, notes on, 171, 224; occurrence in Tanganyika, 698; in U.S.A., 171, 711; study on, 711; varietal resistance to, 171.
— mosaic, breeding against, 499; cocci and *Rickettsia*-like organisms associated with, 418; host range of, 417;

occurrence in New S. Wales, 222; in Russia, 417; in U.S.A., 417, 499, 561; studies on, 417, 561; transmission of, by *Empoasca fabae*, 417; by *Macrosiphum gei*, 417; by seed, 417; types of, 561; varietal resistance to, 417, 561.
[Beans], *Mucor abundans* can infect, 554.
—, — *circinelloides* on, in U.S.A., 554.
—, — *hiemalis* can infect, 554.
—, *Olpidium trifolii* and *O. viciae* can infect, 720.
—, (?) *Pseudomonas seminum* on, in England and France, 555. (See also *Bacillus lathyri* on.)
—, — *utiformica* can infect, 378.
—, *Pythium butleri* on, in U.S.A., 218.
—, — *splendens* var. *hawaiianum* on, in Hawaii, 546.
—, *Rhizopus arrhizus* can infect, 554.
—, — *nigricans* on, in U.S.A., 554.
—, *Sclerotinia sclerotiorum* on, in U.S.A., 313.
—, *Sclerotium rolfsii* on, in the Gold Coast, 696; in U.S.A., 349.
—, tobacco mosaic and ring spot can infect, 6.
—, *Uromyces appendiculatus* on, in Guatemala, 431; in U.S.A., 284.
—, — *fabae* on, in Guatemala, 431.
Beauveria bassiana on *Astycus*, 179.
— — on bees, pathogenicity of, 180.
— — on beetles, caterpillars, and centipedes, 179.
— — on *Curculio caryae* in U.S.A., 299.
— — on *Cyclopeltella siccifolia*, *Haplocerambyx spinicornis*, longicorn larvae, and millipedes, 179.
— — on *Pyrausta nubilalis* in U.S.A., 299.
— *densa* on beetles, a leafhopper, and Lepidoptera, 179.
— *globulifera* on *Pyrausta nubilalis* in U.S.A., 299.
— *laxa* on *Brachartona catoxantha*, Lepidoptera, spiders, Tineidae, and *Tortrix*, 179.
— *peteloti* stated to be a *Sporotrichum* growing on *Hirsutella saussurei*, 179.
Beech (*Fagus*), diseases of, due to Basidiomycetes in Russia, 612.
—, dying-off of, in Canada, 410.
—, *Fomes connatus* on, in Norway, 137.
—, — *fomentarius* on, in Austria, 81.
—, — *vegetus* on, in Japan, 12.
—, *Nummularia regia* on, in Spain, 611.
—, *Polyporus connatus* on, see *Fomes connatus* on.
—, — *giganteus* on, in Russia, 680.
—, *Stereum* (?) *purpureum* on, in Germany, 414.
Bees, *Aspergillus flavus*, *Beauveria bassiana*, and *Isaria farinosa* on, pathogenicity of, 180.
—, *Spicaria* (*Isaria*) *swantoni* on, in England, 241.
Beet (*Beta vulgaris*), *Actinomyces cretaceus*, *A. intermedius*, *A. nigrificans*, *A. rosellus*, *A. tenax*, and *A. violaceus* on, in Esthonia, 25.
[Beet], *Alternaria tenuis* on, in Germany, 147.
—, *Aphanomyces levis* on, in Germany, 559.
—, *Cercospora betae* on, in U.S.A., 356.
—, — *beticola* on, breeding against, 498; control, 19, 277, 348, 687; factors affecting, 19, 347, 687; losses caused by, 19; occurrence in Austria, 19; in Germany, 147, 347; in Poland, 20; in Spain, 348, 687; in U.S.A., 277, 498; studies on, 19, 147, 277, 347, 687; viability of, 347.
—, curly top of, attenuation and restoration of virulence of virus of, 688; can infect *Phaseolus lunatus*, 219; infecting beans in U.S.A., 219, 556; (?) rhubarb in U.S.A., 430; occurrence in the Argentine, 562; in U.S.A., 162, 419, 688; study on, 419; transmission of, by *Eutettix tenella*, 419; to tomatoes, 562; varietal resistance to, 162.
—, damping-off of, in U.S.A., 589.
— dry rot in Germany, 559; in Holland, 148; in Poland, 149; relation of boron deficiency to, 147; of soil alkalinity to, 149. (See also *Phoma betae*.)
— heart rot in Germany, 559; in Holland, 147; in Switzerland, 495; relation of boron deficiency to, 147. (See also *Phoma betae*.)
—, 'late blight' of, in U.S.A., 148.
—, leaf discoloration of, in Holland, 96.
— mosaic, control, 91; effect of, on yield, 90; intracellular bodies in, 89; occurrence in Czecho-Slovakia, 157, 424; in the Ukraine, 89; overwintering of, on weeds, 90; studies on, 89; transmission of, by *Aphis rumicis*, *Chlorita flavescens*, *Lygus pratensis*, and *Poeciloscytus cognatus*, 90; by knives, 90; types of, 89, 424.
—, *Peronospora schachtii* on, in U.S.A., 162, 419.
—, *Phoma betae* on, control, 356, 760; effect of, on yield, 760; factors affecting, 490, 760; note on, 148; occurrence in Germany, 559; in Holland, 148; in the Ukraine, 760; in U.S.A., 356, 490. (See also Dry and Heart rot of.)
—, *Pseudomonas utiformica* can infect, 379.
—, *Pythium* on, in Holland, 127.
—, — *adhaerens* can infect, 605.
—, — *de Baryanum* on, in Germany, 559.
—, *Ramularia betae* on, in Denmark and Germany, 147.
—, reclamation disease of, *Pythium* in relation to, in Holland, 127.
—, *Sclerotinia* (?) *intermedia* on, in the Ukraine, 556.
—, — *sclerotiorum* on, in Germany, 489.
—, *Sclerotium rolfsii* on, in U.S.A., 349.
—, *Sporodesmium putrefaciens* on, in Germany, 147.
—, tobacco ring spot virus (?) infecting, in the Ukraine, 90.

[Beet], *Uromyces betae* on, in the Ukraine, 91 ; *Darluca filum* parasitizing, 91.
— virus diseases in the Caucasus, Russia, and the Ukraine, 89.
—, yellowing disease of, in Holland, 96, 767.
Beetles, *Beauveria bassiana* and *B. densa* on, 179.
—, *Hirsutella eleutheratorum* on, in Great Britain, 573 ; *Isaria eleutheratorum* renamed, 573.
Begonia mosaic in Denmark, 768.
—, *Pythium de Baryanum* on, in U.S.A., 718.
(?) *Bemisia*, transmission of tobacco 'kroepoek' (leaf curl) by, in Java, 479.
— *gossypiperda*, transmission of cotton leaf curl by, in the Sudan, 238 ; (?) of tobacco leaf curl by, in Nyasaland, 806 ; in Rhodesia and Tanganyika, 676 ; (?) of zinnia leaf curl by, in India, 573 ; not accepted, 781.
Benzene, use of, against (?) *Tarsonemus floricolus* in fungus cultures in Italy, 118.
Benzoic acid, toxicity of, to micro-organisms, 466.
— —, use of, against *Ceratostomella paradoxa* on pineapple in Australia, 192.
Berberis, see Barberry.
Bentonite sulphur, note on, 385.
— —, use of, against *Venturia inaequalis* on apple, 788.
Beryllium in relation to physiological disorders of citrus, 570.
Beta bourgaei, *B. macrocarpa*, *B. maritima*, *B. patellaris*, *B. patula*, *B. procumbens*, *B. scutellaris*, *B. vulgaris* var. *abyssinica*, and *B.v.* var. *cicla*, *Peronospora schachtii* can infect, 420.
— *vulgaris*, see Beet.
Betanal, use of, against *Cercospora beticola* on beet, 348.
Betula, see Birch.
Bidens pilosa, pineapple yellow spot can infect, 586.
Birch (*Betula*), *Armillaria mellea* on, in U.S.A., 337.
—, *Diaporthe aristata* on, in Norway, 136.
—, *Fomes vegetus* on, in Japan, 12.
—, *Hydnum murashkinskyi* and *H. reflexum* on, in Eastern Asia and Siberia, 268.
—, *Libertella betulina* on, in U.S.A., 337.
—, *Polyporus betulinus* on, in Japan, 552.
—, *Torula ligniperda* on, in Canada, 137.
—, *Trametes radiata* on, in Eastern Asia and Siberia, 268.
Bispora effusa on mine timber in S. Africa, 684.
— *monilioides* on timber in Russia, 612.
'Bitten off' disease of tea in Ceylon, 749.
Björklund dusting apparatus, 672.
Blackberry (*Rubus*), *Bacterium tumefaciens* on, in England, 423.
—, *Fusisporium rubi* on, in U.S.A., 727.
[Blackberry], (?) *Mycosphaerella rubi* on, in England, 61.
—, *Phragmidium violaceum* on, in England, 61.
—, *Septoria* on, in England, 61.
Black heart of potato in Alaska, 357 ; in India, 126.
'— nose' of date palm in U.S.A., 572.
— point (physiological) of wheat in the Argentine, 100.
— root of raspberry in England, 61.
— stem disease of clover in U.S.A., 461.
Blast of oats in Canada, 363.
— of onion in U.S.A., 420.
Blastoconium tropicum on cacao in the Dominican Republic, 30.
Blastodendrion, a genus of the Torulopsidaceae, 477 ; note on, 642.
Blastomyces, see *Blastomycoides*.
Blastomycoides, selective culture medium for, 643.
— *dermatitidis* on man in the Argentine, 43, 643.
— *lanuginosus* renamed *Glenospora lanuginosa*, 106.
Blastulidiopsis chattoni on *Cyclops* eggs in France, 180.
Bleaching powder, see Chloride of lime.
Blechnum amabile and *B. spicant* var. *nipponicum*, *Hyalopsora aculeata* on, in Japan, 813.
(?) *Blepharoptera serrata*, *Cordyceps* and *Stilbella kervillei* on, in England, 42.
Blindness of oats, see Blast of.
Blossom-end rot of chilli in U.S.A., 803, 804.
— — — of tomato in British Guiana, 26 ; in St. Vincent, 698.
Bombyx mori, see Silkworm.
Borassus flabellifer, see Palmyra palm.
Borax, use of, against *Ceratostomella paradoxa* on pineapple, 192 ; against mould and sap stain of timber, 816 ; against *Penicillium digitatum* on citrus, 570 ; against *P. italicum* on citrus, 570 ; on orange, 236 ; against scald of grapefruit, 570. (See also Boric acid, Boron.)
Bordeaux mixture, chemistry of, 524.
— —, cost of spraying apple trees with, in England, 113.
— — injury, 49, 51, 113, 185, 186, 253, 428, 430, 765.
— —, preparation of, 587, 765.
— —, toxic action of, 663.
— —, 'instant', preparation of, 587.
— oil emulsion, use of, against fruit diseases, 247, 655 ; against *Phoma citricarpa* on citrus, 450 ; against *Taphrina deformans* on peach, 519.
— paint, use of, as a wound dressing, 186.
Boric acid, use of, against *Ceratostomella paradoxa* on pineapple, 192 ; against top rot of tobacco, 480. (See also Borax, Boron.)
Boron deficiency in relation to dry and heart rot of beet, 147.

Borrera, Omphalia flavida on, in Guatemala, 431.
Botryodiplodia hypodermia on elm in U.S.A., 212.
— *theobromae, Diplodia musae* may be identical with, 190.
— — on banana in Martinique, 463; in Trinidad, 190.
— — on cacao, control, 26; occurrence in the Gold Coast, 701; in St. Lucia, 26, 698.
— — on *Hevea* rubber in Indo-China, 432.
— — on tea in Malaya, 768.
— — on tobacco in Sumatra, 478.
— — on yams in the Gold Coast, 696.
— *ulmicola* on elm in U.S.A., 212; *Sphaeropsis ulmicola* renamed, 212.
Botryosphaeria ribis can infect lemon, 172.
— — on citrus in Italy, Palestine, and U.S.A., 172; *Dothiorella ribis* imperfect stage of, 172.
— — on lemon in Cyprus, 696.
— *vanillae* on vanilla in Madagascar, 699.
Botrytis in a butter churn in U.S.A., 181.
— on celery in U.S.A., 761.
— on gladiolus in Canada, 244.
— on leek and onion in England, 759.
— on pear in U.S.A., 519.
— on *Pseudotsuga taxifolia* and spruce in Ireland, 413.
— on strawberry in Victoria, 380.
—, toxicity of catechol to, 561.
— *cinerea*, action of luminous rays on, 737.
— — on apple in England, 657; (?) in U.S.A., 115.
— — on banana in Palestine, 728.
— — on bean, artificial immunization against, 593, 798; control, 347; occurrence in Czecho-Slovakia, 624; in England, 143; in Spain, 347; studies on, 347, 798.
— — on chrysanthemum in Germany, 785.
— — on cucumber in Germany, 621.
— — on flax in Latvia, 784.
— — on lavender in England, 107.
— — on lily in Holland, 108.
— (?) — on pear in U.S.A., 115.
— — on potato in Hungary, 222; in Norway, 670.
— — on raspberry in England, 61.
— (?) — on *Ricinus communis* in Guatemala, 431.
— — on rose in New S. Wales, 784; in Poland, 459.
— — on tobacco in Guatemala, 431; (?) in U.S.A., 133.
— — on tomato in Esthonia, 25.
— — on vegetables in Germany, 489.
— — on vine, control, 623; occurrence in France, 623; in Germany, 495; in Switzerland, 692; study on, 623; varietal susceptibility to, 495.
— — on walnut in England, 80.
— —, phenology of, in Austria, 799.
— —, production of sulphuretted hydrogen by, from sulphur, 465.
[*Botrytis cinerea*], toxicity of pentathionic acid to, 465.
— —, variation in, 477.
— *elliptica* on lily in Holland, 108, 243; in U.S.A., 429; strains of, 108, 243; study on, 243.
— *eriophyes* renamed *Cephalosporium* (*Acrostalagmus*) *eriophytis*, 179.
— *fabae* can infect lentils, peas, and vetch, 346.
— — on beans in Spain, 346.
— *galanthina* on snowdrop in Denmark, 460.
— *hyacinthi* on lily in Holland, 108, 244.
— *mali* on apple in U.S.A., 309.
— *narcissicola* on *Narcissus* in Denmark, 460; in U.S.A., 786.
— *tulipae* on tulip in Canada, 108; in Denmark, 460.
— *verrucosa* on tobacco in Sumatra, 478.
Boucherie's process of timber preservation, 815.
Bouisol, comparative analytical study on, 194.
—, use of, against *Phytophthora infestans* on potato, 396.
Boulton's process of timber preservation, 815.
Bovines, *Trichophyton* (?) *album* on, in France, 374.
Box (*Buxus*), *Armillaria mellea* on, in U.S.A., 411.
—, diseases of, in U.S.A., 649.
—, *Macrophoma candollei* f. *ramosa* on, in Spain, 675.
—, *Phoma conidiogena* on, in U.S.A., 581.
—, *Poria* on, in Russia, 681.
Brachartona catoxantha, Beauveria laxa on, 179.
Brachiaria, Cerebella andropogonis on, (?) in the Sudan, 544.
Brachycladium spiciferum on chilli, vegetable marrow, and watermelon in Cyprus, 696.
Brachysporium torulosum synonym of *Helminthosporium torulosum*, 464.
Brassica, Plasmodiophora brassicae on, in England, 686.
— *alba*, see Mustard.
— *campestris*, see Swedes, Turnips.
— *napus*, see Rape.
— *nigra*, see Mustard.
— *oleracea*, see Broccoli, Brussels sprouts, Cabbage, Cauliflower.
— — var. *acephala*, see Kale.
— — var. *caulo-rapa*, see Kohlrabi.
— *pekinensis*, see Cabbage, Chinese.
Bread, *Aspergillus* and *Penicillium* on, in U.S.A., 710.
Breakdown of tomato in Canada, 270.
'Breaking' of tulips, control, 718; cytology of, 183; occurrence in England, 591, 718; (?) in France, 183; study on, 183, 718; two forms of, 797.
Brecolane N, use of, as a spreader, 622.
Bremia lactucae on lettuce in England, 491; viability of, 198.
Brilliant green, toxicity of, to *Aspergillus fumigatus*, 715; to *Penicillium, P. brevicaule, P. candidum*, and *P. luteum*, 716.

[Brilliant green], see also Dyes, aniline.
British Wood Preserving Association, formation of, 487.
Broccoli (*Brassica oleracea*), *Mycosphaerella brassicicola* on, in England, 558.
Brogdex process, use of, against *Penicillium digitatum* and *P. italicum* on citrus, 570; against soft scald of apple, 54.
Bromus arvensis, *Claviceps purpurea* and *Ustilago bromivora* in seed samples of, in Denmark, 304.
— *inermis*, *Bacterium translucens* var. *undulosum* can infect, 434.
— *maximus*, *Puccinia graminis* on, in S. Africa, 231.
— *unioloides*, *Puccinia glumarum* on, in the Argentine, 499.
Bronze leaf wilt of coco-nut in Ceylon, 510; in Trinidad, 283.
Broughtonia, asymbiotic germination of, in Jamaica, 388.
Brown bast of *Hevea* rubber in Indo-China, 432.
— blotch of date palm in U.S.A., 572.
— heart of turnip in Canada, 276.
— root rot of tobacco in U.S.A., 9, 496.
'— stain' of *Corylus avellana* in U.S.A., 683.
Brunchorstia pinea (*B. destruens*), see *Crumenula abietina*.
'Brunol', use of, against *Phytophthora* on *Hevea* rubber, 802.
'Brusone' disease of rice, breeding against, 400; control, 262; factors affecting, 202, 262; losses caused by, 202; occurrence in Italy, 202, 262, 400; varietal susceptibility to, 202.
Brussels sprouts (*Brassica oleracea*), *Bacterium* (*Pseudomonas*) *maculicola* can infect, 146.
— —, *Fusarium conglutinans* on, in U.S.A., 490.
Bubbly fruit rot of tomato in St. Vincent, 699.
Bulgaria polymorpha on timber in Russia, 612.
'Bunch-top' of sugar-cane, see 'Stem galls' of.
Bunchy top of banana in Egypt, legislation against, 752.
— — of *Musa textilis*, control, 46, 183, 300; factors affecting, 300; occurrence in the Philippines, 46, 183, 300; studies on, 46, 300; transmission of, by *Pentalonia nigronervosa*, 46; varietal resistance to, 300.
— — of tomato in S. Africa, 209, 481; transmission of, to *Physalis peruviana*, 210, 482.
Burgundy mixture injury, 429.
Butter, *Epicoccum* (?) *heterochroum* on, in Holland, 374.
—, moulds on, parchment paper as a carrier of, in Austria, 716.
— churns, *Acremoniella*, *Alternaria*, *Aspergillus*, *Botrytis*, *Cephalosporium*, *Chaetomium*, *Gliocladium*, *Hormodendrum*, *Monilia*, *Mucor*, *Oospora*, *Penicillium*, *Phoma*, *Sordaria*, *Spicaria*, *Spondylocladium*, *Sporotrichum*, and *Tilachlidium* in, in U.S.A., 181.
Butyraldehyde, effect of, on growth of moulds, 63.
Buxus, see Box.

Cabbage (*Brassica oleracea*), *Bacterium maculicola* on, in Finland, 146.
—, *Corticium solani* on, in U.S.A., 417.
—, *Fusarium conglutinans* on, in U.S.A., 490.
—, *Peronospora parasitica* on, viability of, 198.
—, *Phoma lingam* on, in Denmark, 489; in S. Africa, 267.
—, *Plasmodiophora brassicae* on, control, 17, 357, 686; occurrence in Alaska, 357; in England, 17, 686; in Germany, 16, 559; in Ireland, 17; in Scotland, 17.
—, *Pseudomonas campestris* on, in Bermuda, 97; in Germany, 687.
Cabbage, Chinese (*Brassica pekinensis*), *Bacillus aroideae* on, in Japan, 700.
—, —, virus disease of, in the Philippines, 285.
'Cabbaging' of tobacco in Nyasaland identical with leaf curl, 676.
Cacao (*Theobroma cacao*), *Alternaria tenuis* and *Aspergillus candidus* on, in the Dominican Republic, 30.
—, *Aspergillus flavus*, *A. fumigatus*, and *A. glaucus* on, in the Dominican Republic, 30; in Nigeria, 285.
—, — *nidulans* and *A. niger* on, in the Dominican Republic, 30.
—, — *sydowi* on, in Nigeria, 285.
—, — *tamarii* on, in the Dominican Republic, 30; in Nigeria, 285.
—, *Blastoconium tropicum* on, in the Dominican Republic, 30.
—, *Botryodiplodia theobromae* on, control, 26; occurrence in the Gold Coast, 701; in St. Lucia, 26, 698.
—, *Cephalosporium acremonium* on, in the Dominican Republic, 30.
—, *Colletotrichum* (?) *cradwickii* on, in the Gold Coast, 701.
—, (?) *Coniothecium effusum* and *Dendryphium congestum* on, in the Dominican Republic, 30.
—, *Fomes lignosus* on, in the Belgian Congo, 2.
—, *Fusarium sarcochroum*, *F. zonatum*, *Helminthosporium cacaophilum*, and (?) *Hormodendrum pallidum* on, in the Dominican Republic, 30.
—, *Marasmius perniciosus* on, control, 433; effect of, on yield, 434; occurrence in British Guiana, 26; in Ecuador, 434; in Surinam, 703; in Trinidad, 433; study on, 433; translation (English) of Stahel's paper on, 703.
—, *Monilia* on, in Ecuador, 434.
—, moulds on, in the Gold Coast, 703; legislation against, in U.S.A., 416.
—, *Mucor mucedo*, *M. racemosus*, *Penicillium* (?) *candidum*, *P. leucopus*, *P.* (?)

luteum, *P. notatum*, and *P.* (?) *roseum* on, in the Dominican Republic, 30.
[Cacao], *Phytophthora palmivora* on, control, 26, 703; effect of, on yield, 431; factors affecting, 698, 701, 702, 703; occurrence in the Gold Coast, 701, 702, 703; in Guatemala, 431; in St. Lucia, 26, 698; in Trinidad, 283; studies on, 701, 702, 703; viability of, in soil, 703.
—, *Pullularia pullulans*, *Rhizopus arrhizus*, and *R. nigricans* on, in the Dominican Republic, 30.
—, *Rosellinia bunodes* on, in St. Lucia, 26.
—, — *pepo* on, in St. Lucia, 26, 698.
—, *Spicaria lateritia* and *Torula sacchari* on, in the Dominican Republic, 30.
—, *Trachysphaera fructigena* on, in the Gold Coast, 701.
—, *Trichothecium roseum* on, in the Dominican Republic, 30.
—, yeasts on, in the Dominican Republic, 31.
Cactus, *Phytophthora* on, in Germany, 651.
Cadmium nitrate, toxicity of, to *Penicillium*, *P. brevicaule*, *P. candidum*, and *P. luteum*, 716.
Cadophora fastigiata on timber in Canada and U.S.A., 14.
Cajanus indicus, see Pigeon Pea.
Cal K, use of, against *Actinomyces scabies* on potato, 259.
Calcium in relation to chlorosis of plants, 325.
— arsenate, adhesiveness of, 442, 586.
— —, use of, against *Bacillus tracheiphilus* on cucumber, 428; with fungicides, 252, 253, 497.
— arsenite, adhesiveness of, to seed-grain, 441.
— bisulphite, fungicidal tests of, 732.
— caseinate, use of, as a spreader, 349, 587.
— chloride as a constituent of mycothanaton, 217.
— cyanamide, use of, against *Plasmodiophora brassicae* on crucifers, 146, 686; against wheat bunt, 565.
— hydrogen sulphide, fungicidal tests of, 732.
— hypochlorite, use of, against *Ceratostomella paradoxa* on pineapple in Australia, 192.
— polysulphide, fungicidal properties of, 732.
— potassium ratio in vine sap in relation to resistance to *Plasmopara viticola*, 155.
— sulphide, calcium sulphite, and calcium thiosulphate, fungicidal tests of, 732.
Caldariomyces fumago, cultural study on, 404; *Fumago vagans* synonym of, 404.
Calendula, rosette of groundnut affecting, in the Gambia, 697.
— *officinalis*, virus disease of, in S. Africa, 427.
Calico disease of potato in U.S.A., 320, 667.
Calliopsis, rosette of groundnut affecting, in the Gambia, 697.
Callistephus chinensis, see Aster, China.
Calochlor, use of, against *Fusarium* on *Narcissus*, 699.
Calogreen, use of, against *Bacterium marginatum* on gladiolus, 428; against *Fusarium* on *Narcissus*, 699.
Calomel, see Mercurous chloride.
Calonectria graminicola on *Agrostis stolonifera* in Great Britain, 246.
— — on barley in Germany, 444.
— — on cereals in Germany, 228.
— — on *Poa annua* in Great Britain, 246.
— — on rye, control, 707, 777; factors affecting, 777; occurrence in Germany, 707; in Latvia, 777; in Poland, 694.
— — on wheat in Germany, 444; varietal susceptibility to, 228.
Calotropis procera, *Cercospora calotropidis* on, in Egypt, 719; synonymy of, 720.
Camelina sativa, *Plasmodiophora brassicae* can infect, 16.
Camellia japonica, *Aithaloderma camelliae* on, in Japan, 330.
— —, *Macrosporium camelliae* on, in S. Africa, 267.
— —, *Pestalozzia guepini* on, in U.S.A., 377.
— —, *Pleospora camelliae* on, in S. Africa, 267.
Campbell's sulphur vaporizer, 211.
Camphor (*Cinnamomum camphora*), (?) *Fomes ulmarius* on, in Japan, 614.
Canavalia, (?) leaf curl of tobacco affecting, in Nyasaland, 806.
— *ensiformis*, *Pythium splendens* var. *hawaiianum* on, in Hawaii, 546.
Cancer, *Bacterium tumefaciens* in relation to, 358, 562.
Candida accepted as a genus of the Torulopsidaceae, 476.
—, note on, 642.
(?) — on fig in Cyprus, 696.
— on man in the British Isles, 645, 714, 715.
(?) — on pear in Cyprus, 696.
— *albicans* on man in U.S.A., 373; synonymy of, 373.
— *krusei* on man in the Argentine, 645.
— *metalondinensis*, synonym of *C. albicans*, 373.
— *pinoyi* on man in England, 714.
— — synonym of *C. albicans*, 373.
— *psilosis* synonym of *C. albicans*, 373.
— *tropicalis* synonym of *C. vulgaris*, 373.
— *vulgaris* on man in U.S.A., 373; *C. tropicalis* synonym of, 373.
Canker of *Cinchona* in the Philippines, 285.
— of poplar, legislation against, in Germany, 607; occurrence in France, 94. (See also *Micrococcus populi* on.)
Canna indica, *Armillaria mellea* on, in Great Britain, 376.
Cannabis sativa, see Hemp.
Cantaloupe (*Cucumis melo*), *Erysiphe cichoracearum* on, in U.S.A., 28.

[Cantaloupe], *Pseudoperonospora cubensis* on, in U.S.A., 28, 430.
Canvas, mildew on, in U.S.A., 240.
Capnodium on citrus in Jamaica, 508.
— *citri* on orange in the Caucasus, 636.
Capsicum annuum, *C. baccatum*, and *C. frutescens*, see Chilli.
Carbolineum, use of, against *Merulius lacrymans* on timber, 217; in Germany, 84; against *Nectria galligena* on pear, 582; against *Phragmidium mucronatum* on rose, 694; against *Poria vaporaria* on timber, 84; against timber-rotting fungi, 83, 146.
Carbon dioxide, stimulation of germination of *Deuterophoma tracheiphila* by, 175.
— — storage of apples, 659.
— disulphide, use of, against *Armillaria mellea*, 681; on pear, 40; against *Phytophthora parasitica nicotianae* in 'dessa' manure, 750; against *Rosellinia necatrix* on fruit trees, 110.
Card's process of timber preservation, 815.
Carica papaya, see Papaw.
Carnation (*Dianthus*), *Alternaria dianthi* on, in U.S.A., 497.
—, *Colletotrichum* (?) *dianthi* on, in Holland, 767.
—, *Corticium solani* on, in S. Africa, 125.
—, diseases of, in U.S.A., 649.
—, *Fusarium* (?) *dianthi* on, in Denmark, 768.
— mosaic in Japan, 797.
—, *Phytophthora* on, in Ceylon, 223.
—, *Puccinia arenariae* on, in Czecho-Slovakia, 624.
—, *Rhizoctonia* on, in U.S.A., 224.
—, *Sporotrichum beurmanni*, *S. councilmani*, and *S. gougeroti* can infect, 647.
—, — *poae* on, in U.S.A., 647.
—, — *pruinosum* can infect, 647.
—, *Uromyces caryophyllinus* on, in U.S.A., 28.
Carrot (*Daucus carota*), *Bacillus* (?) *aroideae* can infect, 209.
—, *Chalaropsis thielavioides* on, in England and Wales, 423.
—, *Corticium solani* on, in Sierra Leone, 97.
—, *Mucor abundans* can infect, 554.
—, *Phymatotrichum omnivorum* can infect, 640.
—, *Rhizopus arrhizus* can infect, 554.
—, *Sclerotinia sclerotiorum* on, in Germany, 489.
—, *Sclerotium rolfsii* on, in U.S.A., 298, 349.
Carthamus tinctorius, see Safflower.
Carum carvi, *Septoria carvi* on, in Germany, 474.
Carya pecan, see Pecan.
Casein, use of, as spreader, 24, 41, 159, 352, 442, 464.
Cassava (*Manihot dulcis*, *M. palmata*, and *M. utilissima*), *Gloeosporium* (?) *manihotis* on, in Sierra Leone, 97.
—, 'Kräuselkrankheit' of, identical with mosaic of, 152.
[Cassava], (?) leaf curl of tobacco affecting, in Nyasaland, 806.
— mosaic, control, 762; etiology of, 20; losses caused by, 152; occurrence in the Belgian Congo, 20, 621, 762; in French W. Africa, 152, 762; in the Gold Coast, 762; in Java, 152; in Sierra Leone, 762; in West Africa, 152, 762; studies on, 152, 761, 762; synonymy of, 152; transmission of, by Aleyrodidae, 621; by grafting, 152, 762; by insects, 20, 762; (?) by *Lecanium* and termites, 152; varietal resistance to, 762.
—, *Phaeolus manihotis* on, in Madagascar, 492.
—, *Phytomonas françai* in, in Brazil, 254.
Castanea, see Chestnut.
Castor, see *Ricinus communis*.
Castor oil, toxicity of, to *Sphaerotheca humuli*, 253.
Casuarina equisetifolia, bacterial root nodules of, in India, 797.
Catalpa, *Microsphaera alni* var. *vaccinii* on, *Cicinnobolus cesatii* parasitizing, in U.S.A., 377.
Catechol in relation to *Botrytis* and *Colletotrichum circinans* on onion, 561.
Caterpillars, *Beauveria bassiana* on, 179.
—, *Hirsutella subulata* on, in Great Britain, 573; *Isaria floccosa* renamed, 573.
Cattleya, asymbiotic germination of, in Jamaica, 388.
—, mycorrhiza of, *Rhizoctonia repens* forming, in Jamaica, 388.
Cauliflower (*Brassica oleracea*), *Bacterium maculicola* can infect, 146; occurrence in Bulgaria, 745.
—, *Fusarium conglutinans* on, in U.S.A., 490.
—, *Phoma lingam* on, in Denmark, 489.
—, *Plasmodiophora brassicae* on, control, 17; occurrence in Alaska, 357; in the British Isles, 17; in Germany, 16.
'Cauliflower' disease of strawberry, 250, 380.
Celery (*Apium graveolens*), *Alternaria* on, in U.S.A., 761.
—, *Botrytis* on, in U.S.A., 761.
—, *Cercospora apii* on, in U.S.A., 761.
—, heart rot of, in Canada, 279.
—, (?) *Olpidium* on, in England, 91.
—, *Phoma apiicola* on, in England, 91.
—, (?) *Pythium artotrogus* on, in England, 91.
—, *Sclerotinia sclerotiorum* on, in Germany, 489.
—, *Septoria apii* on, in England, 91.
Cellulose, decomposition of, by soil micro-organisms, 263.
Celtis sinensis, (?) *Fomes ulmarius* on, in Japan, 614.
Centipedes, *Beauveria bassiana* on, 179.
Centre rot of tomato in U.S.A., 27.
Centrosema pubescens, *Corticium solani* on, in Java, 601.
— —, diseases of, in Ceylon, 601.
Cephaleuros henningsii on vanilla in Madagascar, 699.

Cephalosporium in a butter churn in U.S.A., 181.
— on banana in the Canary Islands, 281.
— on elm in U.S.A., 213.
— on man in the Argentine, similarity of, to *Verticillium*, 516.
— *acremonium* on cacao in the Dominican Republic, 30.
— (*Acrostalagmus*) *aphidicola* on aphids, 179.
— *carpogenum* on apple in U.S.A., 309.
— *crassum* on *Pentalonia nigronervosa*, 179.
— *dipterigenum* on a fly in England, 241.
— (*Acrostalagmus*) *eriophytis*, *Botrytis eriophyes* renamed, 179; on *Eriophyes ribis*, 179.
— (*Acrostalagmus*) *muscarium* on flies in England, 241.
— *sacchari* on sugar-cane in the Argentine, 562; in the Philippines, 203.
Cerastium viscosum, *Peronospora alsinearum* on, in U.S.A., 75.
Ceratostomella on timber in Queensland, 216.
— *adiposum* on *Eleocharis tuberosa* (?) in China, 544.
— *buxi* on timber in Russia, 616.
— *castaneae* on timber in Russia, 616, 681.
— *coerulea* on timber in Russia, 616.
— *fimbriata* on *Hevea* rubber in Malaya, 744, 768.
— — on sweet potato in U.S.A., 535.
— *ips* on pine in U.S.A., 341.
— *paradoxa* on banana, legislation against, in the Argentine, 415; in Spain, 752; note on, 189; occurrence in Martinique, 463.
(?) — — on coco-nut in St. Lucia, 27.
— — on date palm in U.S.A., 509, 572; in N. Africa, 510.
— — on oil palm in Malaya, 105, 769.
— — on pineapple, control, 192; legislation against, in the Argentine, 415; in Spain, 752; losses caused by, 192; occurrence in Australia, 192, 252.
— — on sugar-cane, control, 542; notes on, 542; occurrence in Mauritius, 127; in the Philippines, 203; in Porto Rico, 542.
— — on various fruits, legislation against, in the Argentine, 415.
— *piceae* on timber in Russia, 616.
— *pini* on pine in U.S.A., 340.
— — on timber in Russia, 616.
— *ulmi* can infect lime tree, 275; *Zelkova serrata*, 484.
— — on elm, common name of disease caused by, 611; control, 13, 138, 275, 409, 483, 810; earliest record of, 610; factors affecting, 13, 274, 337; host range of, 275; legislation against, in Austria, 416; in the British Isles, 544; in Germany, 208, 272, 415, 607; (proposed), 13; in Norway, 136; in Spain, 752; in various countries, 336; losses caused by, 96; notes on, 13, 14, 95, 274, 275, 336, 551, 810; occurrence in Austria, 416, 755; in England, 336; in France, 95, 409, 551, 610; in Germany, 13, 14, 208, 272, 274, 275, 336, 415, 607; in Holland, 96, 138, 336, 484; in Italy, 766, 810; in Rumania, 156; in Switzerland, 483; perfect stage of *Graphium ulmi*, 409; review of work on, 336; studies on, 410, 484; transmission of, by *Scolytus*, 14, 138, 337, 409, 483, 484; specific and varietal resistance to, 95, 96, 138, 274, 336, 484, 485, 766, 810; viability of, 484.
rcospora on *Chenopodium album* in U.S.A., 498.
— on chilli in U.S.A., 803.
— on clover in U.S.A., 498.
— on coffee in India, 368.
— on eggplant in Malaya, 354.
— on lucerne and *Melilotus alba* in U.S.A., 498.
— on pigeon pea in India, 425.
—, phenology of, in Austria, 799.
—, taxonomy of, 129.
— *apii* on celery in U.S.A., 761.
— *arachidis* synonym of *C. personata*, 20.
— — var. *macrospora* regarded as distinct from *C. personata*, 20.
— *betae* on beet in U.S.A., 356.
— *beticola*, method of testing viability of conidia of, 400.
— — on beet, breeding against, 498; control, 19, 277, 348, 687; factors affecting, 19, 347, 687; losses caused by, 19; occurrence in Austria, 19; in Germany, 147, 347; in Poland, 20; in Spain, 348, 687; in U.S.A., 277, 498; studies on, 19, 147, 277, 347, 687; viability of, 347.
— *calotropidis* on *Calotropis procera* in Egypt, 719; synonymy of, 720.
— *canescens* on *Amaranthus*, 130.
— — on bean, 130; in Guatemala, 431.
— — on cowpea, *Petunia parviflora*, *Phaseolus lunatus*, *Ricinus communis*, tomato, and *Vigna glabra*, 130.
— *capsici* on chilli, control, 803; occurrence in Spain, 281, 605; in U.S.A., 803, 804; synonymy of, 605.
— *cassavae*, *C. cearae*, *C. henningsii*, and *C. manihotis* synonyms of, 129.
— —, *Ragnhildiana manihotis* formerly identified as, 130.
— *cearae* synonym of *C. cassavae*, 129.
— *circumscissa* on *Prunus mume* in Japan, 789.
— *coffeae* on coffee in Guatemala, 431.
— *coffeicola* on coffee in Trinidad, 283.
— *coriandri* on coriander in Russia, 73.
— *cruenta*, *C. dolichi* may be identical with, 130.
— —, differentiation between *C. daizu* and, 87.
— — on bean, cowpea, *Dolichos*, *Phaseolus lunatus*, and *P. mungo*, 130.
— *daizu* on soy-bean in Siberia, 87; *Mycosphaerella phaseolicola* (?) perithecial stage of, 88.
— *diazu*, an erroneous spelling for *C. daizu*, 87.
— *dioscoreae* on yams in Ceylon, 223.

[*Cercospora*] *dolichi* may be identical with *C. cruenta*, 130.
— — on *Dolichos* (?) *lablab* in Italian Somaliland, 475.
— *domingensis* synonym of *C. calotropidis*, 720.
— *fusca* on pecan in U.S.A., 213.
— *handelii* on *Rhododendron lateritium* and *R. obtusum* in Japan, 518.
— *henningsii*, *Ragnhildiana manihotis* formerly identified as, 130.
— — synonym of *C. cassavae*, 129.
— *inconspicua* synonym of *C. calotropidis*, 720.
— *kaki* on persimmon in Japan, 795.
— *kopkei* on sugar-cane in Java, 205; in the Philippines, 203, 205.
— *longipes* on sugar-cane in Mauritius, 127.
— *malayensis* on *Hibiscus esculentus* in the Philippines, 130.
— *malkoffii* on aniseed in Russia, 73.
— *manihotis* synonym of *C. cassavae*, 129.
— *melonis* on cucumber in England, 421.
— *microsora* synonym of *C. calotropidis*, 720.
— *moricola* on mulberry in Italian Somaliland, 475.
— *musarum* synonym of *Helminthosporium torulosum*, 464.
— *nicotianae* on tobacco, *C. raciborskii* distinct from, 129; control, 76, 134, 677; factors affecting, 477; losses caused by, 677; occurrence in Guatemala, 431; in Malaya, 769; in Porto Rico, 677; in Queensland, 76; in Rhodesia, 677; in Sumatra, 134, 477; study on, 134.
— *patouillardi* synonym of *C. calotropidis*, 720.
— *personata* on groundnut, control, 279; losses caused by, 279; occurrence in the Cameroons and French W. Africa, 279; in the Gambia, 27; in Guatemala, 430; in Italian Somaliland, 20; in U.S.A., 430; study on, 20; synonyms of, 20; varietal susceptibility to, 430.
— *raciborskii* on tobacco in Hawaii, 129.
— *rosaecola* on rose in Victoria, 516.
— *sesami* on sesame in Uganda, 353.
— *vignicola* on cowpea in Japan, 149.
Cercosporella caryigena, see *Mycosphaerella caryigena*.
— *gossypii* (= *Ramularia areola*), *Mycosphaerella areola* ascigerous stage of, 512.
— *herpotrichoides*, *Leptosphaeria herpotrichoides* confused with, 361.
— — on wheat in France, 361, 503.
Cerebella andropogonis on *Brachiaria* and *Sorghum lanceolatum* (?) in the Sudan, 544.
Ceresan, cost of, 295, 454.
—, effect of storage on germination of wheat dusted with, 567.
—, estimation of mercury in, 314.
—, factors affecting the action of, 707; the germination of seed-grain treated with, 773.
[Ceresan], persistence of, on seed-grain, 706.
—, use of, against *Calonectria graminicola* on rye, 707, 777; against *Corticium solani* on cotton, 455; against *Fusarium* on rye, 775; against *F. lini* on flax, 182; against *Gibberella moniliformis* on cotton, 430, 454; against *Helminthosporium avenae* on oats, 295; against *H. gramineum* on barley, 766, 775; against *Narcissus* diseases, 786; against *Pleospora alternariae* on tobacco, 77; against *P. graminea* on barley, 162; against seed-borne diseases, 36; against *Urocystis occulta* on rye, 38, 162; against *Ustilago avenae* and *U. kolleri* on oats, 634; against wheat bunt, 162, 289; against wheat diseases, 775.
Cereus grandiflorus, *C. marginatus*, and *C. spachianus*, *Pythium de Baryanum* on, in Italy, 719.
Ceroplastes in relation to sooty mould on orange in the Caucasus, 635.
Cerotelium desmium on cotton in Italian Somaliland, 475.
— *fici* on fig in India, 282.
— — on mulberry in Tanganyika, 698.
Ceuthospora lunata on cranberry in U.S.A., 188.
Chaenomeles lagenaria, *Bacillus amylovorus* can infect, 306.
Chaetomella on apple in U.S.A., 378.
Chaetomium in a butter churn in U.S.A., 181.
— *cochlioides*, saltation in, 593.
Chalaropsis thielavioides on carrot in England and Wales, 423.
— — on walnut in England, 80, 423; in Wales, 423.
Chamaecyparis, *Pestalozzia funerea* on, in U.S.A., 377.
— *thyoides*, *Armillaria mellea*, *Asterina cypressina*, *Didymascella chamaecyparissi*, *Fomes annosus*, *Gymnosporangium botryapites*, *G. myricatum*, *Lophodermium juniperinum*, *Polyporus schweinitzii*, (?) *Poria weirii*, and *Trametes carnea* on, in U.S.A., 140.
Chamaesyce albomarginata, *Phymatotrichum omnivorum* on, in U.S.A., 370.
Cheese, member of the Perisporiaceae on, in England, 516.
—, *Penicillium nalgiovensis* in, in Czecho-Slovakia, 574.
Chefdebien dust, composition of, and use of, against vine diseases in France, 154.
Chenopodium album as a host for beet mosaic in the Ukraine, 90.
— —, *Cercospora* on, in U.S.A., 498.
— *murale*, attentuation of beet curly top virus by passage through, 688.
Cherry (*Prunus avium* and *P. cerasus*), bacterial fruit spot of, in England, 22.
—, *Cladosporium carpophilum* on, in Bulgaria, 475.
—, *Clasterosporium carpophilum* on, control, 582, 694; factors affecting, 799; occurrence in Germany, 186, 799; in Norway, 582; in Switzerland, 694.

[Cherry], *Dibotryon morbosum* on, legislation against, in the British Isles, 543.
—, *Leucostoma persoonii* can infect, 60.
—, *Pseudomonas mors-prunorum* on, in England, 726.
—, — *prunicola* can infect, 311.
—, — *utiformica* can infect, 379.
—, 'Rigi' disease of, in Switzerland, 694.
—, *Sclerotinia cinerea* on, in Norway, 582; in Spain, 307.
—, — — f. *pruni* on, in England, 311.
—, *Taphrina cerasi* on, in Czecho-Slovakia, 424.
—, *Valsa japonica* can infect, 60.
Cheshunt compound, use of, against *Corticium solani* on coffee, 26; against *Sclerotium rolfsii* on various plants, 547; against seed-bed diseases, 253.
Chestnut (*Castanea*), *Daedalea quercina* on, in U.S.A., 275.
—, *Endothia parasitica* on, legislation against, in the British Isles, 543; in Spain, 752; notes on, 160; occurrence in U.S.A., 160, 275; utilization of timber infected by, 275.
—, *Endothiella* (?) *gyrosa* can infect, 611.
—, *Nummularia regia* on, in Spain, 611.
—, *Phytophthora cambivora* on, in Italy, 485; parasitic action of, 391.
—, *Polyporus croceus* on, in Russia, 680; *P. pilotae* synonym of, 680.
—, — *dryadeus* on, in Russia, 680.
—, — *gilvus*, *P. pilotae*, *P. spraguei*, *P. sulphureus*, and *Polystictus pergamenus* on, in U.S.A., 275.
Cheyletus, transmission of fig diseases by, in U.S.A., 522.
Chickpea, see *Cicer arietinum*.
Chilli (*Capsicum annuum*), *Alternaria* on, in U.S.A., 804.
—, — *solani*, *Bacillus aroideae*, and *B. carotovorus* on, in U.S.A., 803.
—, *Bacillus coli-capsici* on, in Italy, 673.
—, *Bacterium solanacearum* on, in Porto Rico, 29; in S. Africa, 123.
—, — *vesicatorium* on, in U.S.A., 803, 804.
—, blossom-end rot of, in U.S.A., 803, 804.
—, *Brachycladium spiciferum* on, in Cyprus, 696.
—, *Cercospora* on, in U.S.A., 803.
—, — *capsici* on, control, 803; occurrence in Spain, 281, 605; in U.S.A., 803, 804; synonymy of, 605.
—, *Choanephora cucurbitarum* on, in U.S.A., 803.
—, *Colletotrichum capsici* on, in U.S.A., 430, (?) 804.
—, *Corticium solani* on, control, 803; occurrence in Sierra Leone, 97; in U.S.A., 803, (?) 804.
—, *Didymella lycopersici* can infect, 809.
— diseases in U.S.A., 617.
—, *Fusarium* on, in India, 426.
—, *Glomerella cingulata* (?) can infect, 313; occurrence in U.S.A., 803; *Colletotrichum nigrum* and *Gloeosporium piperatum* imperfect stages of, 803.
[Chilli], *Helminthosporium curvulum* on, in U.S.A., 803.
—, leaf curl of, in India, 781.
—, — roll of, in U.S.A., 356.
— mosaic, control, 803; occurrence in Guatemala, 431; in Peru, 226; in U.S.A., 356, 803, 804; transmission of, by seed, 356.
—, *Mucor* on, in U.S.A., 804.
—, — *abundans*, *M. circinelloides*, and *M. hiemalis* can infect, 554.
—, *Oidiopsis sicula* on, in Spain, 281, 605.
—, *Oidium* on, in Guatemala, 431.
—, *Phoma destructiva* on, in U.S.A., 803.
—, *Phytophthora capsici* on, in Porto Rico and U.S.A., 803.
—, *Puccinia paulensis* on, in (?) Colombia and Guatemala, 606.
—, (?) *Pythium de Baryanum* on, in U.S.A., 804.
—, *Rhizopus arrhizus* can infect, 554.
—, *Sclerotinia sclerotiorum* on, in U.S.A., 803, (?) 804.
—, *Sclerotium rolfsii* on, control, 803; occurrence in U.S.A., 349, 803, 804.
—, sun scald of, in U.S.A., 804.
—, tobacco mosaic can infect, 8.
—, tomato spotted wilt can infect, 549.
—, *Vermicularia capsici* on, see *Colletotrichum capsici* on.
—, *Verticillium albo-atrum* on, in Bulgaria, 745.
'Chinoblettes', use of, against *Phytophthora* on cactus, 651.
Chinosol, see Quinosol.
Chloride of lime, use of, against *Fusarium cubense* on banana, 25; against *Gloeodes pomigena* on oranges, 105; against *Nummularia regia* on oak, 612.
Chlorita biguttula in relation to cyrtosis of cotton in China, 298.
— *flavescens*, transmission of beet mosaic by, in the Ukraine, 90.
Chloroform, effect of, on growth of moulds, 63.
Chlorosis of apple in U.S.A., 811.
— of banana in Jamaica, 25.
— of cottonwood in U.S.A., 811.
— of groundnut in the Gambia, 697.
— of lupin in Germany, 721.
— of orange in U.S.A., 571.
— of pine in England, 326.
— of plants, biochemical study on, 387; iron- and manganese-induced forms of, 326; occurrence in England, 325.
— of strawberry, 250.
— of trees in U.S.A., 499.
— (infectious) of *Abutilon* in Germany, 256; transmission of, to various species of *Abutilon*, 256.
— — of *Abutilon striatum*, biochemical studies on, 387, 592; occurrence in Sweden, 387, 592; in U.S.A., 406.
— — of banana, see Heart rot of.
— — of rose in Canada, 245.
Chlorotic disease of hops in England, 423, 539, 745; study on, 539.
— streak disease of sugar-cane in

Hawaii, 4, 540, 674; similarity of, to the Java 'fourth disease', 4.
Choanephora cucurbitarum on chilli in U.S.A., 803.
Chromium salts as constituents of thanalith U, 85.
— —, use of, in timber preservation, 815.
Chrysanthemum, Bacterium tumefaciens on, in Germany, 785.
—, *Botrytis cinerea* on, in Germany, 785.
—, *Cylindrosporium chrysanthemi* on, in U.S.A., 224.
—, diseases of, in U.S.A., 649.
—, *Oidium chrysanthemi* on, control, 680, 785; occurrence in Czecho-Slovakia, 624; in England, 680; in Germany, 785.
—, *Puccinia chrysanthemi, Septoria chrysanthemella,* and *S. rostrupii* on, in Germany, 785.
—, tomato spotted wilt can infect, 549.
—, *Verticillium* on, in U.S.A., 375.
—, — *albo-atrum* on, in Germany, 785.
— *frutescens, Bacillus radiobacter* can infect, 357.
— *leucanthemum, Septoria cercosporoides* on, in S. Africa, 267.
— *sinense, Bacterium solanacearum* on, in Sumatra, 477.
Chrysomyxa pyrolae on spruce in Finland, 214.
— *rhododendri* on rhododendron and spruce in France, 553.
Chrysophyllum cainito, rosette of groundnut affecting, in the Gambia, 697.
Cicadula sexnotata transmitting yellow dwarf of onion in U.S.A., 557.
Cicadulina mbila in relation to a maize disease resembling streak in Tanganyika, 592.
— —, overwintering of streak virus in, in S. Africa, 67.
— —, transmission of streak disease of maize, sugar-cane, and wild grasses by, in S. Africa, 66.
— —, use of, in testing filterability of maize streak virus, 506.
— *zeae*, transmission of maize streak by, in Tanganyika, 592.
Cicer arietinum, Ascochyta rabiei on, control, 347; occurrence in France, 23, 150, 344; in Spain, 347; *Phyllosticta rabiei* renamed, 150; study on, 150; varietal resistance to, 23, 344.
— —, *Corticium solani, Fusarium,* and *Mystrosporium* on, in India, 425.
— —, *Phyllosticta rabiei* on, see *Ascochyta rabiei.*
— —, *Sclerotium* on, in India, 425.
Cichorium endivia, see Endive.
Cicinnobolus cesatii parasitizing *Erysiphe cichoracearum, E. polygoni, Microsphaera alni, M. alni* var. *vaccinii,* and *Sphaerotheca pannosa* in U.S.A., 377.
Cinchona, canker of, in the Philippines, 285.
—, (?) *Diplodia* on, in Java, 131.
—, *Fusarium* on, in Indo-China, 433.
—, *Phytophthora* on, in India, 426.
[*Cinchona*], *Rosellinia* on, in Indo-China, 433.
Cinnamomum camphora, see Camphor.
Citric acid, effect of, on keeping quality of Burgundy mixture, 429.
Citromyces, biochemistry of, 119.
— *ramosus* on date palm in U.S.A., 572.
Citron (*Citrus medica*), *Fusarium lateritium* can infect, 307.
—, — *solani* can infect, 39.
Citrullus vulgaris, see Watermelon.
Citrus, Armillaria mellea on, in U.S.A., 40.
—, *Botryosphaeria ribis* on, in Italy, Palestine, and U.S.A., 172; *Dothiorella ribis* imperfect stage of, 172.
—, *Capnodium* on, in Jamaica, 508.
—, *Corticium koleroga* on, legislation against, in Spain, 752.
—, — *salmonicolor* on, legislation against, in Spain, 752; occurrence in Queensland, 40.
—, *Deuterophoma tracheiphila* on, in Italy, 174.
—, *Diplodia natalensis* on, control, 365, 508; factors affecting, 508; notes on, 570; occurrence in Jamaica, 26, 365, 508; in U.S.A., 570.
— diseases in U.S.A., 364.
—, *Epicoccum purpurascens* on, in S. Africa, 638.
— exanthema in S. Africa, 105.
—, foliocellosis of, in Jamaica, 26.
—, *Fusarium lateritium* on, in S. Europe, 307.
—, — *solani* on, in Egypt, 39.
—, *Gloeodes pomigena* on, in U.S.A., 365.
—, gummosis of, in Jamaica, 26, 625; in U.S.A., 365.
—, gum spot of, in Cyprus, 571.
—, *Leptothyrium pomi* on, in Palestine 173; in U.S.A., 365.
— mosaic in Italy, 591.
—, mottle leaf of, in U.S.A., 570.
—, *Penicillium* on, in Australia, 105.
—, — *digitatum* on, biochemistry of, 120; control, 366, 570; occurrence in Jamaica, 366; in U.S.A., 570.
—, — *italicum* on, diagnostic chemical product of, 120; occurrence in U.S.A., 570.
—, *Phomopsis* on, in Jamaica, 365, 508.
—, — *citri* on, in U.S.A., 771.
—, *Phytophthora* on, in India, 235.
—, — *citrophthora* on, control, 779; factors affecting, 779; legislation against, in the Argentine, 415; occurrence in S. Africa, 331; in Western Australia, 779.
—, — *hibernalis* on, in New S. Wales, 222.
—, *Pseudomonas citri* on, control, 752; legislation against, in the Argentine, 415; in U.S.A., 752.
—, *Pythium irregulare* on, in S. Africa, 331.
—, root disease of, in Jamaica, 625.
—, scaly bark of, in Jamaica, 26.
—, wastage of, in S. African fruit, 104.
Citrus aurantifolia, see Lime.

[*Citrus*] *aurantium*, see Orange.
— *bigaradia*, see Orange.
— *decumana*, see Grapefruit.
— *grandis*, see Grapefruit.
— *medica*, see Citron, Lime.
— *nobilis*, see Orange.
— *sinensis*, see Orange.
— *unshiu*, see Orange.
Cladochytriaceae, characters of the thallus in, 403.
Cladochytrium, morphology of, 403.
Cladosporium in relation to diamond spot of cotton fabrics, 241.
— on *Aphis sacchari*, in the Philippines, 640.
— on apple in U.S.A., 656.
— on locusts in Russia, 42.
— on orange in the Caucasus, 635.
— on pecan in U.S.A., 552.
— on tomato in Esthonia, 25.
— *carpophilum* on cherry in Bulgaria, 475.
— — on peach in U.S.A., 661.
— *colocasiae* on *Colocasia antiquorum* in the Gold Coast, 763.
— *cucumerinum* on cucumber, control, 688, 690 ; factors affecting, 688, 690 ; occurrence in Czecho-Slovakia, 157 ; in Germany, 688 ; in Holland, 690 ; study on, 690 ; varietal resistance to, 690.
— *cyclaminis* on cyclamen in U.S.A., 460.
— *effusum* on pecan in U.S.A., 213.
— *fulvum* on tomato, control, 211, 428, 561, 679, 680, 767 ; factors affecting, 561 ; genetics of resistance to, 409; occurrence in England, 211, 679 ; in Esthonia, 25 ; in Germany, 680 ; in Holland, 767 ; in Jamaica, 625 ; in Trinidad, 610 ; in U.S.A., 409, 428, 497, 561 ; varietal susceptibility to, 409, 497.
— —, toxicity of sulphur to, 465.
— *herbarum*, action of luminous rays on, 737.
— —, *Mycosphaerella tulasnei* perithecial stage of, 310.
— — on *Abutilon avicennae* in Russian Central Asia, 183.
— — on meat, effect of carbon dioxide on growth of, 574.
— — on timber in Russia, 616.
— — var. *citricola* on orange in Ceylon, 223.
— *macrocarpum* on spinach (?) in Holland, 767 ; in Hungary, 222.
— *malorum* on apple in U.S.A., 310.
Clasterosporium on apple in U.S.A., 248.
— on apricot in Switzerland, 187.
— on mulberry in Italian Somaliland, 476.
— *carpophilum* on cherry, control, 582, 694 ; factors affecting, 799 ; occurrence in Germany, 186, 799 ; in Norway, 582 ; in Switzerland, 694.
— — on damson in Uruguay, 226.
— — on peach, control, 186 ; factors affecting, 799 ; occurrence in Germany, 186, 799 ; in Uruguay, 226 ; varietal resistance to, 186.
[*Clasterosporium carpophilum*] on plum in Uruguay, 226.
Claviceps purpurea in seed samples of *Alopecurus pratensis*, *Avena elatior*, *Bromus arvensis*, clover, *Cynosurus cristatus*, *Dactylis glomerata*, *Festuca pratensis*, *Holcus lanatus*, *Lolium perenne*, *Phleum pratense*, *Poa pratensis*, and *P. trivialis* in Denmark, 304.
— — in bread, cereals, and flour, medical aspects of, 103.
— —, monograph on, 445.
— — on rye in Germany, 38 ; in Russia, 282.
— —, production of alkaloids by, in culture, 38.
Cleome, *Omphalia flavida* on, in Guatemala, 431.
Clitocybe candicans in mushroom beds in Austria and Denmark, 493.
— *diatreta* and *C. rivulosa* var. *angustifolia* on pine and spruce forming mycorrhiza in U.S.A., 527.
— *tabescens* on banana in U.S.A., 382.
— — on grapefruit and orange in U.S.A., 365.
Clonostachys araucaria, action of ultraviolet and luminous rays on, 737.
Clover (*Trifolium*), *Ascochyta trifolii* on, synonym of *Stagonosporopsis trifolii*, 654.
—, *Bacterium radiciperda* on, in Russia, 652.
—, — (?) *tabacum* can infect, 77.
—, black stem disease of, in U.S.A., 461.
—, *Cercospora* on, in U.S.A., 498.
—, *Claviceps purpurea* in seed samples of, in Denmark, 304.
—, *Colletotrichum trifolii* on, in U.S.A., 461.
—, *Erysiphe polygoni* on, breeding against, 499 ; *Cicinnobolus cesatii* parasitizing, 377 ; occurrence in Canada, 246 ; in U.S.A., 377, 499 ; varietal resistance to, 246.
—, *Fusarium* on, action of luminous rays on, 737.
—, — *trifolii* on, in Czecho-Slovakia, 624.
—, *Kabatiella caulivora* on, in Denmark, 768 ; in U.S.A., 461.
—, *Olpidium trifolii* on, in Czecho-Slovakia, 721 ; in Japan, 720 ; *Synchytrium trifolii* identical with, 721 ; *Urophlyctis bohemica* confused with, 721.
—, — *viciae* can infect, 720.
—, *Plenodomus meliloti* on, in Canada, 246.
—, reclamation disease of, in Denmark, 767.
—, root rot of, in U.S.A., 461.
—, *Sclerotinia trifoliorum* on, control, 720 ; factors affecting, 25 ; losses caused by, 25 ; occurrence in Canada, 246 ; in Denmark, 304, 768 ; in Esthonia, 25; in Germany, 559, 720 ; in U.S.A., 461.
—, *Typhula trifolii* on, in Denmark, 304, 768.
—, *Uromyces trifolii* on, in England and Wales, 423.

[Clover], white spot of, attributed to potash deficiency in Denmark, 768.
—, winter injury of, in U.S.A., 460.
'Clump' disease of groundnut in India, 223; in Senegal, 93.
Coal-tar, use of, as a wound dressing, 185, 236, 247.
— — creosote, toxicity of components of, to *Fomes annosus* and *Trametes serialis*, 758.
— — —, use of, as a timber preservative, 685.
— — derivatives, use of, against *Merulius lacrymans* on timber, 217; as timber preservatives, 85.
— —, see also Creosote, Tar.
Coccidioides on man in Brazil, 643.
— *immitis* on man, isolation of, from soil, 643; occurrence in the Argentine, 43, 515; in U.S.A., 643; referred to the Chytridineae, 515.
— —, *Pseudococcidioides mazzai* synonym of, 782.
Coccids, see Scale insects.
Coccus on lilac in France, 305.
Cochlearia armoracia, see Horse-radish.
Coco-nut (*Cocos nucifera*), *Aspergillus chevalieri* on copra from, in England, 175.
—, — *cinnamonensis* on copra from, in Malaya, 636.
—, — *flavus-oryzae* on copra from, in England, 175; in Malaya, 636.
—, — *glaucus* on copra from, in Malaya, 636.
—, — *niger* and *A. tamarii* on copra from, in England, 175; in Malaya, 636.
—, *Bacillus coli* on, bud rot attributed to, 41.
—, bacteria on, (?) in St. Lucia, 27; on copra from, in Malaya, 636.
—, bronze leaf wilt of, in Ceylon, 510; in Trinidad, 283.
—, (?) *Ceratostomella paradoxa* on, in St. Lucia, 27.
— diseases, general account of, 41.
—, *Epicoccum cocos* on, in the Philippines, 780.
—, leaf collapse of, in the Gold Coast, 696.
—, — yellows and little leaf of, in St. Lucia, 27.
—, *Mucor racemosus*, *Penicillium* spp., and *P. candido-fulvum* on copra from, in England, 175.
—, *Pestalozzia palmarum* on, in the Philippines, 780.
—, *Phytophthora palmivora* on, (?) in St. Lucia, 27; production of oospores in paired cultures of, 206.
—, *Rhizopus nigricans* and *Scopulariopsis* on copra from, in England, 175.
—, senility of, in St. Lucia, 27.
—, *Syncephalastrum* (?) *cinereum* on copra from, in England, 175.
—, wilt disease [non parasitic] of, in British Guiana, 26.
—, withering leaf disease of, in St. Lucia, 27.
Coffee (*Coffea*), (?) *Armillaria mellea* on, in Madagascar, 699.
—, *Cercospora* on, in India, 368.
—, — *coffeae* on, in Guatemala, 431.
—, — *coffeicola* on, in Trinidad, 283.
—, *Colletotrichum* on, in Costa Rica, 368.
—, — *coffeanum* on, see *Glomerella cingulata* on.
—, *Corticium koleroga* on, in Guatemala, 431.
—, — *salmonicolor* on, in Indo-China, 432.
—, — *solani* on, in Jamaica, 26.
—, die-back of, in India, 368.
—, *Fomes lamaoensis* on, in India, 367; in Java, 72.
—, *Fusarium* on, in Costa Rica, 369.
—, — *eumartii* on, in Tanganyika, 712.
—, — *lateritium* var. *longum* on, in Tanganyika, 712; believed to be conidial stage of *Gibberella baccata*, 712.
—, *Gloeosporium* on, in Costa Rica, 369.
—, — *coffeicola* on, in Tanganyika, 712; considered identical with *Colletotrichum coffeanum*, 712.
—, *Glomerella cingulata* on, control, 159; factors affecting, 159; occurrence in India, 368; in Indo-China, 432; in Kenya, 159; in Malaya, 769.
—, *Hemileia vastatrix* on, control, 368, 572; notes on, 572; occurrence in India, 368, 511, 636; in Malaya, 769; in Rhodesia, 572; physiologic specialization in, 511, 636; seasonal periodicity of, 368; varietal susceptibility to, 511, 636.
—, *Mycothecium* (?) *advena* on, in Malaya, 769.
—, *Nematospora coryli* on, control, 353; differentiation between *N. gossypii* and, 572; occurrence (?) in Kenya, 572; in Tanganyika, 572; in Uganda, 353, 572; transmission of, by *Antestia* sp., 353.
—, — *gossypii* on, in (?) Kenya, Tanganyika, and Uganda, 572.
—, *Omphalia flavida* on, in Guatemala, 431; in Trinidad, 283.
—, *Pestalozzia funerea* on, in Kenya, 159.
—, phloem necrosis of, in Brazil and British Guiana, 637; in Surinam, 237, 637.
—, (?) *Phytomonas* [*Leptomonas*] on, in Brazil, 637.
—, — *leptovasorum* on, in Surinam, 237. (See also phloem necrosis of.)
—, (?) *Polyporus coffeae* on, in Madagascar, 699.
—, *Rhizoctonia* on, in India, 367.
—, *Rosellinia* (?) *arcuata* on, in India, 367.
—, *Sclerotium coffeicolum* on, in British Guiana, 26; in Trinidad, 283.
—, Sphaeriaceous fungus on, in Costa Rica, 369.
—, top die-back of, in Java, 636.
— wilt in British Guiana, 236.
Coix lacryma-jobi, mosaic of, in New Guinea, 265.
Cola acuminata, see Kola nut.

Colatox, use of, against *Bacterium pruni* on peach in U.S.A., 355.
Colchicum, *Sclerotium tuliparum* on, in England and Wales, 423.
Collar disease of *Hevea* rubber in Indo-China, 539.
— rot of tea in Malaya, 769.
Colletotrichum on coffee in Costa Rica, 368.
— on cotton in India, 223.
— on tobacco causing 'stem and rib scorch' in Germany, 753.
— *atramentarium* on potato in England, 144, 202, 323.
— — on tomato in Holland, 767.
— *cajani* on pigeon pea in India, 425; *Glomerella cingulata* ascigerous stage of, 425.
— *capsici* on chilli in U.S.A., 430, (?) 804.
— — on eggplant and tomato in Malaya, 354.
— —, *Vermicularia capsici* renamed, 545.
(?) — *caulicola* on *Phaseolus lunatus* in U.S.A., 149.
— *circinans* can infect apple, *Eschscholzia californica*, peas, and *Tropaeolum majus*, 392.
— — on onion in U.S.A., 392.
— —, toxicity of catechol to, 561.
— *coffeanum*, *Gloeosporium coffeicola* considered identical with, 712. (See also *Glomerella cingulata*.)
— (?) *cradwickii* on cacao in the Gold Coast, 701.
— *curcumae*, *Vermicularia curcumae* renamed, 545.
— (?) *dianthi* on carnation in Holland, 767.
— *digitalis* on *Digitalis ferruginea* in Hungary, 328; *Gloeosporium digitalis* renamed, 328.
— *falcatum* on sugar-cane in Indo-China, 432; in Mauritius, 127; in the Philippines, 203, 204; in U.S.A., 75, 543; varietal susceptibility to, 75, 205, 543.
— *gloeosporioides*, *Gloeosporium mangiferae* (?) identical with, 793.
— — on lemon in Uruguay, 226.
— — on orange in Cyprus, 696; (?) in England, 366; in Uruguay, 226; stimulatory effect of ammonia on, 366.
— *jatrophae*, *Vermicularia jatrophae* renamed, 545.
— *lagenarium* on melon in Hungary, 619, 620.
— — on watermelon, note on, 620; occurrence in U.S.A., 422.
— *lindemuthianum*, method of testing viability of conidia of, 400.
— — on bean, control, 687; factors affecting, 278; genetics of resistance to, 618, 666; occurrence in Germany, 277, 618, 666, 687; physiologic forms of, 277, 618; studies on, 277, 618; varietal susceptibility to, 278, 618.
— *nigrum* imperfect stage of *Glomerella cingulata*, 803.
— *punctiforme*, *Vermicularia punctiforme* renamed, 545.
— *trifolii* on clover in U.S.A., 461.
[*Colletotrichum*] *zingiberis*, *Vermicularia zingiberis* renamed, 545.
Colloidal copper injury, 560.
— —, use of, against *Plasmopara viticola* on vine, 692.
— sulphur, analytical evaluation of, 587.
— —, toxicity of, to *Sclerotinia americana*, 385.
— —, use of, against *Cladosporium fulvum* on tomato, 211; against fruit diseases, 582, 655; against *Podosphaera leucotricha* on apple, 519; against *Septoria acicola* on pine, 814.
— —, hydrophilic, use of, against *Cladosporium fulvum* on tomato, 428; against *Erysiphe cichoracearum* on cucumber, 152; against *Mycosphaerella pomi* and *Venturia inaequalis* on apple, 427.
Collybia dryophila, effect of irradiation on growth of, 593.
— *velutipes*, resistance of, to extreme cold, 318.
Colocasia antiquorum, *Cladosporium colocasiae*, *Fusarium*, *Phyllosticta colocasiae*, *Pythium aphanidermatum*, *Rhizoctonia*, and *Sclerotium rolfsii* on, in the Gold Coast, 763.
Commelina, *Omphalia flavida* on, in Guatemala, 431.
Comptonia asplenifolia, *Cronartium comptoniae* on, in U.S.A., 616.
Conifers, *Fomes annosus* and *F. roseus* on, in Canada, 615.
—, *Fusarium* on, in England, 413.
—, *Polyporus schweinitzii* on, in N. America, 614.
—, *Trichoderma nunbergii* in feeding galleries of *Pityogenes curvidens* in, in Silesia, 757.
Coniophora cerebella on timber, control, 83, 415; factors affecting, 414; occurrence in England, 274; in Germany, 414; in Russia, 83.
— —, testing of timber preservatives against, 84.
— —, toxicity of arsenic acid and copper sulphate to, 84; of thanalith U to, 85.
— —, use of, in tests of timber preservatives, 487.
— *sibirica* on timber in Eastern Asia and Siberia, 268.
Coniosporium bambusae, action of ultra-violet rays on, 737.
— *onychophilum* on man in Italy, 45, 577.
Coniothecium chomatosporum on apple in England, 51.
(?) — *effusum* on cacao in the Dominican Republic, 30.
Coniothyrium concentricum on *Yucca* in England, 22.
— *diplodiella* on rose in U.S.A., 785.
— — on vine, control, 692; effect of, on wine, 21; notes on, 692; occurrence in Switzerland, 21, 24, 692; in Uruguay, 226; viability of, 24.
— *dispersellum* on timber in Russia, 616.
— *sacchari* on sugar-cane in Indo-China, 432.

[*Coniothyrium*] *viburni* on *Viburnum davidi* in France, 651.
— — on *Viburnum opulus* in Hungary, 651.
— *wernsdorffiae* on rose in Poland, 459.
— *zingiberi* on ginger in the Philippines, 74.
Copper, estimation of, in plant protectives, 663.
—, solubility of, in spray deposits, 663.
— acetate, use of, against *Cercospora kopkei* on sugar-cane, 205; against *Plasmopara viticola* on vine, 693; against wheat bunt, 100.
— arsenite, fungicidal action of, and toxicity to wheat bunt spores in soil, 443.
— carbonate, adhesiveness of, to seed grain, 441, 502, 586.
— —, cost of, 100.
— —, fungicidal action of, 443.
— —, use of, against *Cercospora beticola* on beet, 348; against *Erysiphe polygoni* on sweet peas, 224; against *Phytophthora cinnamomi* on *Rhododendron*, 627; against *Pythium de Baryanum* and *Rhizoctonia* on cucumber, 350; against *Sphacelotheca sorghi* on sorghum, 103, 448; against *Ustilago hordei* on barley, 505; against wheat bunt, 100, 162, 232, 289, 290, 442, 706.
— chloride, chemicotherapic effect of, on mycoses caused by *Aspergillus fumigatus*, 715.
— —, toxicity of, to *Armillaria mellea*, 681.
— -chromium compound, process for the production of a, in timber preservation, 815.
—, colloidal, see Colloidal copper.
— compounds, stimulatory action of seed steeps of, 279.
— content of sprayed hops, 602.
— deficiency disease of fruit trees in S. Africa, 724.
— dusts, adherence of, to foliage, 733.
— hydroxide, use of, against *Phytophthora infestans* on potato, 396; against *Venturia inaequalis* on apple, 626.
— -lime dusts, injury caused by, 356, 421.
— — —, use of, in Germany, 680; in U.S.A., 350, 356, 421, 428.
— oleate, use of, against *Venturia inaequalis* on apple, 626.
— oxychloride, use of, against wheat bunt, 100, 442, 566.
— phosphate, fungicidal action of, 443.
— salts, effect of absorption of, on disease resistance of cucurbits, 355.
— stearate dust, use of, against *Pseudoperonospora cubensis* on cucumber, 421.
— sulphate, anhydrous, use of, against *Cercospora kopkei* on sugar-cane, 205; against *Ustilago avenae* on oats, 290; against wheat bunt, 290.
— —, *dosis tolerata* of, for tomato seed, 483.
— —, effect of, on germination of wheat, 169.
[Copper sulphate], factors affecting germination of seed-grain treated with, 773.
— — impregnated wrappers, use of, against *Botrytis* (?) *cinerea* on pears, 115.
— —, monohydrated, with hydrated lime dust, adherence of, 733.
— —, —, use of, against *Cladosporium* on pecan, 552; against wheat bunt, 289.
— — soil treatment against *Armillaria mellea*, 681; against *Ganoderma pseudoferreum* on tea, 131; against reclamation disease of barley, clover, lucerne, oats, swedes, and turnips, 767; against *Rosellinia necatrix* on fruit trees, 110.
— — — —, effect of, on susceptibility of rice to *Piricularia oryzae*, 800.
— —, toxicity of, to *Cladosporium* on orange, 636; to *Armillaria mellea*, 681; to *Coniophora cerebella* and *Schizophyllum commune*, 84.
— —, use of, as a timber preservative, 83, 815.
— — and caustic soda, use of, against *Phytophthora infestans* on potato in the Channel Islands, 494.
— sulphides, fungicidal action of, 443.
—, see also Cupric.
Copra, see Coco-nut.
Corchorus, see Jute.
'Corcovo' disease of tobacco in the Argentine, 269.
Cordyceps, notes on, 640.
— on (?) *Blepharoptera serrata* in England, 42.
— *blattae* renamed *Ophiocordyceps blattae*, 179.
— *lloydii*, *C. sherringii* (?) an immature stage of, 179.
— *peltata* renamed *Ophiocordyceps peltata*, 179.
— *rhizoidea* renamed *Ophiocordyceps rhizoidea*, 179.
— *sherringii* on the ant, (?) an immature stage of *C. lloydii*, 179.
— *sinensis*, notes on, from China and Tibet, 372.
— *unilateralis* renamed *Ophiocordyceps unilateralis*, 179.
'Core rot' of tomato, see 'Centre rot' of.
Coriandrum sativum, *Cercospora coriandri*, *Protomyces macrosporus*, and *Puccinia petroselini* on, in Russia, 73.
Corona oat dust, composition of, and use of, against *Ustilago avenae* and *U. kolleri* on oats, 634.
Corticium on rubber in the Belgian Congo, 2.
— *centrifugum* not accepted as the perfect stage of *Sclerotium rolfsii*, 748.
— — on China Aster, with imperfect stage resembling *Sclerotium rolfsii*, in Italy, 405, 746, 748.
— — on rice in Japan, 539, 801.
— — on soy-bean in Siberia, 89.
— —, sclerotial stage of, named *Sclerotium centrifugum*, 749.
— —, Wolf's American strain of *Sclero-*

tium rolfsii regarded as a strain of, 749.
[*Corticium*] *fusiforme* on turf in England, 246.
— *koleroga* on citrus, legislation against, in Spain, 752.
— — on coffee in Guatemala, 431.
— *rolfsii*, perfect stage of *Sclerotium rolfsii* named, 748, 749.
— *salmonicolor* on citrus, legislation against, in Spain, 752; occurrence in Queensland, 40.
— — on coffee in Indo-China, 432.
— — on *Hevea* rubber in Malaya, 744.
— — on tea in Malaya, 768.
— *sasakii* on rice, factors affecting, 539; occurrence in Japan, 1, 538, 801; in the Philippines, 1; confused with *C. solani*, 1.
— *solani* can infect lily, 243.
— — on *Amaranthus* in Sierra Leone, 97.
— — on beans in the Gold Coast, 696.
— — on cabbage in U.S.A., 417.
— — on carnation in S. Africa, 125.
— — on carrot in Sierra Leone, 97.
— — on *Centrosema pubescens* in Java, 601.
— — on chilli, control, 803; occurrence in Sierra Leone, 97; in U.S.A., 803, (?) 804.
— — on *Cicer arietinum* in India, 425.
— — on coffee in Jamaica, 26.
— — on cotton, control, 299, 455; factors affecting, 454; notes on, 455; occurrence in China, 298; in Egypt, 454; in Peru, 455; in Rhodesia, 638; *Rhizoctonia gossypii* regarded as distinct from, 454; study on, 454; varietal resistance to, 298.
— — on *Fragaria californica* and *F. cuneifolia* in U.S.A., 661.
— — on lettuce in U.S.A., 491.
— — on *Leucaena glauca* in Java, 601.
— — on orange in Italy, 766.
— — on *Piper betle* in India, 426.
— — on potato, control, 125, 259, 260, 322, 355, 397, 534, 626, 671, 800; factors affecting, 125, 201, 259, 468; occurrence in Canada, 259, 468; in England, 144, 323; in France, 260; in Germany, 65; in Kenya, 67; in New Zealand, 201, 260, 534; in Norway, 670; in Peru, 226; in Rhodesia, 67; in Scotland, 323; in S. Africa, 125; in U.S.A., 355, 469, 532, 626, 671; in Western Australia, 397; physiology of, 468; relation of, to 'potato sickness' of soil, 144, 202, 323; spread of, 201; strains of, 469; studies on, 201, 468, 534; varietal susceptibility to, 226.
— — on *Pseudotsuga taxifolia* in Ireland, 413
— — on *Pteridium aquilinum* var. *pubescens* in U.S.A., 661.
— — on rice in Ceylon, 599.
— — on spruce in Ireland, 413.
— — on strawberry in U.S.A., 661.
— — on sugar-cane in the Philippines, 203.
[*Corticium solani*] on *Thevetia neriifolia* in Sierra Leone, 97.
— — on tomato in U.S.A., 408.
(?) — — on turf in England, 246.
— — on turnip in Sierra Leone, 97.
— —, physiologic forms of, 601.
— —, production of sulphuretted hydrogen by, from sulphur, 465.
Corylus avellana, 'brown stain' of, in U.S.A., 683.
— —, *Nematospora coryli* on, in Italy and Sicily, 811.
Coryneum on apricot in France, 23.
— *microstictum* var. *staphyleae* on *Staphylea trifolia* in U.S.A., 339.
— *myristicae* on nutmeg in Java, 673.
Cosan, use of, against *Microsphaera quercina* on oak, 682.
Cotton (*Gossypium*), *Acremoniella* on, in Rhodesia, 638; (?) in Uganda, 638.
—, *Alternaria* on, in Peru, 225.
—, — *gossypina* on, in Rhodesia, 371, 638; *Macrosporium gossypinum* renamed, 371.
—, — *macrospora* and *A. tenuis* on, in Rhodesia, 638.
—, bacteria on, 176.
—, bacteriosis of, in Russia, 41; in Russian Central Asia, 316.
—, *Bacterium erivanse* and *Bact. löhnisi* on, in Russia, 41.
—, — *malvacearum* on, breeding against, 699; control, 454, 638; factors affecting, 297, 354, 451; occurrence in Egypt, 176; in Guatemala, 431; in Rhodesia, 638; in Russia, 41; in Russian Central Asia, 316; in St. Vincent, 699; in the Sudan, 176, 450, 451; in Trinidad, 176; in Uganda, 353, 451; in U.S.A., 298, 454, 511; serological studies on, 176, 298; studies on, 297, 353, 451; systemic infection by, 511; not accepted, 354; varietal resistance to, 451, 699.
—, — (?) *mori* on, in Rhodesia, 638.
— boll and lint rots in Russia, 41.
—, *Cerotelium desmium* on, in Italian Somaliland, 475.
—, *Colletotrichum* on, in India, 223.
—, *Corticium solani* on, control, 299, 455; factors affecting, 454; notes on, 455; occurrence in China, 298; in Egypt, 454; in Peru, 455; in Rhodesia, 638; *Rhizoctonia gossypii* regarded as distinct from, 454; study on, 454; varietal resistance to, 298.
—, cyrtosis of, in China, 298.
—, *Epicoccum purpurascens* on, in Rhodesia, 638.
—, *Erysiphe malachrae* on, in Peru, 225, 511; *Ovulariopsis gossypii* (?) conidial stage of, 512.
—, *Fusarium* on, in Uganda, 353.
—, — *angustum*, *F. orthoceras*, and *F. solani* on, in Egypt, 513.
—, — *vasinfectum* on, breeding against, 453; control, 160, 638; factors affecting, 160, 638, 699, 781; invasion of resistant and susceptible varieties by, 781; occurrence in India, 453, 781;

in Peru, 225; in Russian Central Asia, 316; in U.S.A., 160, 453, 638, (?) 699, 713; studies on, 453, 713, 781; varietal resistance to, 225, 453, 638, 781.
[Cotton, *Fusarium vasinfectum*] var. *aegyptiacum* on, in Egypt, 178.
—, — — var. *inodoratum* on, in Egypt, 513; (?) in Russia, 41.
—, *Gibberella moniliformis* on, in U.S.A., 430, 453.
—, *Glomerella gossypii* on, in Rhodesia, 638.
—, *Hydnum* on, in U.S.A., not a stage of *Phymatotrichum omnivorum*, 27.
—, 'kigabi' of, in Uganda, 353.
— leaf curl (?) affecting zinnia in India, 573, 781; breeding against, 450; control, 239; effect of, on yield, 451; factors affecting, 451, 452; histological effects of, 452; incubation period of, 238; note on, 781; occurrence in the Sudan, 238, 450, 451; relation of, to mosaic, 239; studies on, 238, 451; transmission of, 452; by *Bemisia gossypiperda*, 238, 573; to *Hibiscus*, 239; varietal resistance to, 450.
—, (?) *Macrophomina phaseoli* on, in India, 104, 224.
— mosaic, relation of leaf curl to, 239.
—, *Mycosphaerella areola* on, in U.S.A., 512; ascigerous stage of *Ramularia areola* (*Cercosporella gossypii*), 512.
—, *Nematospora coryli* on, in Rhodesia, 638.
—, — *gossypii* on, in Russia, 42; in Uganda, 353.
—, obscure disease of, in Italian Somaliland, 475.
—, *Ovulariopsis gossypii* on, (?) conidial stage of *Erysiphe malachrae*, 512.
—, *Pestalozzia gossypii* on, in China, 746.
—, *Pestalozzina* on, in Rhodesia, 638.
—, (?) *Phaeolus manihotis* on, in Madagascar, 492.
—, *Phyllosticta gossypina* on, in Rhodesia, 638.
—, *Phymatotrichum omnivorum* on, control, 240, 370; cycles of growth of, 240; effect of, on leaf temperature, 573; of date of planting on, 639; host range of, 177, 370, 640; *Hydnum* not a stage of, 27; indigenous in U.S.A., 370; notes on, 27; occurrence in U.S.A., 27, 176, 177, 240, 298, 370, 573, 639, 640; physiologic forms of, 176; studies on, 177, 370, 639, 640; viability of, 177.
—, potash hunger of, see 'rust' of.
—, *Ramularia areola* on, see *Mycosphaerella areola* on.
—, *Rhizoctonia gossypii* on, *Corticium solani* regarded as distinct from, 454.
—, *Rhizopus nigricans* on, in Rhodesia, 638.
— root rot in India, 453; in Russia, 41.
— 'rust' in U.S.A., 160, 638; relation of, to *Fusarium vasinfectum*, 638.
—, *Sclerotium rolfsii* on, control, 298; occurrence in India, 560; in U.S.A., 298, 349; study on, 298.
[Cotton], sooty moulds of, in Italian Somaliland, 475.
—, *Verticillium albo-atrum* on, control, 514; effect of, on yield, 514; occurrence in Bulgaria, 745; in Russia, 41; (?) in U.S.A., 513, 699; study on, 513; varietal resistance to, 514.
—, raw and textile, 'diamond spot' of, in England, moulds in relation to, 241.
Cottonseed oil, toxicity of, to *Sphaerotheca humuli*, 253.
Cottonwood (*Populus*), chlorosis of, in U.S.A., 811.
—, *Cytospora* on, in Canada, 137.
Cotyledon, *Phytophthora* (?) *parasitica* on, in S. Africa, 331.
Cowpea (*Vigna sinensis*), *Bacillus radiobacter* on, in U.S.A., 357.
—, *Cercospora canescens* and *C. cruenta* on, 130.
—, — *vignicola* on, in Japan, 149.
—, *Fusarium tracheiphilum* on, in U.S.A., 220.
—, *Macrophomina phaseoli* on, in U.S.A., 711.
—, *Nematospora coryli* on, in Tanganyika, 698.
—, *Olpidium trifolii* and *O. viciae* can infect, 720.
—, *Phymatotrichum omnivorum* can infect, 177.
—, *Pseudomonas utiformica* can infect, 378.
—, *Pythium splendens* var. *hawaiianum* on, in Hawaii, 546.
Cracking of potato tubers in U.S.A., 668.
Cranberry (*Vaccinium*), *Acanthorhynchus vaccinii*, *Ceuthospora lunata*, *Diaporthe vaccinii*, *Exobasidium oxycocci*, *E. vaccinii*, *Glomerella cingulata* var. *vaccinii* (*G. rufomaculans* var. *vaccinii*), and *Godronia cassandrae* on, in U.S.A., 188.
—, *Guignardia vaccinii* on, in U.S.A., 188, 429.
— mycorrhiza, *Phoma radicis* forming, in U.S.A., 317.
—, *Mycosphaerella nigro-maculans*, *Pestalozzia guepini* var. *vaccinii*, *Psilocybe agrariella* var. *vaccinii*, and *Sclerotinia oxycocci* on, in U.S.A., 188.
—, senescence or sterile breakdown of, in U.S.A., 189.
—, *Sporonema oxycocci* on, in U.S.A., 188.
—, storage rots of, in U.S.A., 188, 662.
—, *Synchytrium vaccinii* on, in U.S.A., 188.
Crataegus, *Bacillus amylovorus* on, in New Zealand, 184.
—, *Gymnosporangium globosum* on, in U.S.A., 412.
—, — *myricatum* on, in U.S.A., 140.
— *oxyacantha*, *Bacillus amylovorus* on, in U.S.A., 305.
Creosote, toxicity of, to wood-destroying fungi, 14.
—, use of, as a timber preservative, 414, 487, 488, 617, 815; as a wound dressing, 236.

[Creosote], see also Coal tar, Tar.
'Crepe leaf' of strawberry in U.S.A., 771.
Crimp disease of strawberry, see *Aphelenchus fragariae* on.
Crinkle of potato, complex nature of, 394, 738, 739; cytology of, 532; effect of, on acidity of the tuber, 122; note on, 319; occurrence in England, 122, 394; in Ireland, 532, 739; in Kenya, 67; in Portugal, 68; in Rhodesia, 67; in Wales, 319; relation of, to potato mosaic, 256, 739; to potato streak, 740; to potato sub-crinkle, 740; to potato virus disease A, 740; of *y* virus to, 394, 738; transmission of, by ultra-filtered virus, 256. (See also Paracrinkle.)
— A of potato, complex nature of, 594, 739; occurrence in England, 594.
— of strawberry in U.S.A., 792.
— of tobacco, see Leaf curl of.
Crinkling and crinkly dwarf of tobacco, see Leaf curl of.
Crocus, *Pachybasium bulbicolum* on, in Japan, 304; *Sporotrichum radicicolum* renamed, 304.
—, *Sclerotium gladioli* on, in Holland, 767; in N. America, 665; *Sclerotinia* ascigerous stage of, 665.
—, *Trichoderma narcissi* on, in Japan, 304; *Sporotrichum narcissi* renamed, 304.
—, virus disease of, in England, 591.
Cronartium comptoniae can infect *Myrica carolinensis*, 616.
— — on *Comptonia asplenifolia* and *Myrica gale* in U.S.A., 616.
— — on pine in Canada and U.S.A., 615.
— *ribicola* on currant in Canada, 553; pine eradication against, in Norway, 136.
— — on pine, legislation against, in U.S.A., 208; losses caused by, 142; occurrence in Canada, 553; in Germany, 81; in Norway, 136; in U.S.A., 142, 143, 161, 208, 276, 486; *Ribes* eradication against, in Canada, 553; in U.S.A., 142, 143, 161, 276, 486; specific susceptibility to, 81.
— — on *Ribes* in Canada, 553.
Crotalaria, diseases of, in Ceylon, 601.
— mosaic in Hawaii, 116; transmission of, to pineapple, causing yellow spot, 116.
—, *Parodiella grammodes* on, in Ceylon, 749.
— *incana*, *Phymatotrichum omnivorum* can infect, 177.
— *juncea*, *Fusarium* on, in India, 282.
— —, — (?) *vasinfectum* on, in Trinidad, 107.
— —, mosaic of, in Japan, 797.
— —, *Uromyces decoratus* on, in Ceylon, 223.
— *spectabilis* and *C. striata*, *Phymatotrichum omnivorum* can infect, 177.
— *usaramoensis*, (?) leaf curl of tobacco affecting, in Nyasaland, 806.
Cruciferae, *Plasmodiophora brassicae* on, control, 146, 415, 555, 686; factors affecting, 16; occurrence in England, 146, 686; in Germany, 16, 490; in New Zealand, 415, 555; specialization in, 16.
[Cruciferae], *Pseudomonas campestris* on, in Bermuda, 97.
—, *Sclerotinia sclerotiorum* on, in Russia, 45.
Crumenula abietina on pine in Denmark and Great Britain, 757; in Norway, 136.
— *pinicola* on pine in Norway, 136.
Cryptococcus (*pro parte*) as a synonym of *Pityrosporum*, 642.
— on man in the Argentine, 43.
— *farcinimosus* on equines (?) in Italy, 641.
— *mitis* and *C. psicrofilicus* on man in the Argentine, 644.
— *quasilinguae-pilosae* on man in U.S.A., 515.
Cryptomeria, *Pestalozzia funerea* on, in U.S.A., 377.
— *japonica*, *Fomes ulmarius* on, in Japan, 614, 616.
Cryptomyces maximus on *Salix* in Scotland, 139.
Cryptorrhynchus lapathi in relation to the bacterial disease of *Salix* in Holland, 411; to *Bacterium tumefaciens* on *Salix americana* in Czecho-Slovakia, 274.
Cryptosporella viticola on vine in Canada, 790.
(?) *Cryptosporium minimum* on raspberry in England, 61.
Crystal violet, toxicity of, to *Aspergillus fumigatus*, 715; to *Penicillium candidum*, 716; to *Phytophthora*, 206.
— —, use of, in media, 206, 723.
— —, see also Dyes, aniline.
Ctenomyces not accepted as the ascigerous stage of *Trichophyton mentagrophytes*, 515.
Cucumber (*Cucumis sativus*), *Alternaria cucumerina* on, in U.S.A., 557.
—, *Bacillus tracheiphilus* on, in U.S.A., 428.
—, (?) *Bacterium lacrymans* on, in Germany, 92.
—, 'Bettendorf mosaic' of, renamed cucumber virus 2, 349.
—, *Botrytis cinerea* on, in Germany, 621.
—, *Cercospora melonis* on, in England, 421.
—, *Cladosporium cucumerinum* on, control, 688, 690; factors affecting, 688, 690; occurrence in Czecho-Slovakia, 157; in Germany, 688; in Holland, 690; study on, 690; varietal resistance to, 690.
—, damping-off of, in U.S.A., 589.
—, *Erysiphe cichoracearum* on, in England, 680; in U.S.A., 152.
— mosaic, control, 557; genetics of resistance to, 349; local lesions of, 334; note on, 406; occurrence in Czecho-Slovakia, 258; in U.S.A., 6, 334, 349, 557; overwintering of, on weeds, 557; relation of, to tobacco diseases, 6; to

tomato streak, 6; study on, 349; transmission of, 334; types of, 6, 349; virus of, affecting tobacco in U.S.A., 6, 334, 406.
[Cucumber], *Pseudoperonospora cubensis* on, control, 421; notes on, 496; occurrence in Czecho-Slovakia, 157; in U.S.A., 421, 496; overwintering of, 496.
—, *Pythium* on, in England, 93.
—, — *adhaerens* can infect, 605.
—, — *de Baryanum* on, in Czecho-Slovakia, 157; in U.S.A., 350.
—, — *dictyosporum* can infect, 605.
—, *Rhizoctonia* on, in U.S.A., 350.
—, *Rhizopus arrhizus* and *R. fusiformis* can infect, 554.
—, *Sclerotinia sclerotiorum* on, in Germany, 620.
—, *Sclerotium rolfsii* on, in U.S.A., 349.
— virus 1, 'white pickle mosaic' renamed, 349. (See also Mosaic of.)
— — 2, 'Bettendorf mosaic' renamed, 349; can infect *Cucumis anguria* and watermelon, 349. (See also Mosaic of).
Cucumis anguria, cucumber virus 2 can infect, 349.
— *melo*, see Cantaloupe, Melon.
— *sativus*, see Cucumber.
Cucurbita, see Squash.
— *pepo*, see Vegetable marrow.
Cucurbits, *Erysiphe cichoracearum* on, in Cyprus, 696.
—, leaf curl of, in India, 781.
Cultures, method of making preparations from, 795.
—, American collection of type, 467.
Cumin (*Cuminum cyminum*), *Macrosporium* on, in India, 282.
—, *Oidium* on, in India, 282.
—, *Stemphylium* on, in Cyprus, 695.
Cunninghamella, decomposition of hemicelluloses by, 263.
Cupric chloride, use of, against wheat bunt, 100, 442, 443, 566; against *Ustilago avenae* on oats, 100.
— dusts, use of, against *Phytophthora infestans* on tomato, 78.
— steatite dust, use of, against *Ustilago avenae* on oats and wheat bunt, 100.
— sulphosteatite dust, use of, against *Erysiphe polygoni* on melon, 94.
Cuprite, use of, against *Phytophthora infestans* on potato, 396.
Cuprous chloride, fungicidal action of, 443.
— —, use of, against wheat bunt, 443.
Cupulvit, use of, against *Cercospora beticola* on beet, 348; against *Cladosporium fulvum* on tomato, 767; against *Colletotrichum* on tobacco, 754.
Curculio caryae, *Beauveria bassiana* and *Metarrhizium anisopliae* on, in U.S.A., 299.
Curl disease of *Euphorbia pulcherrima* in Germany, 302.
Curly dwarf of potato in Kenya, 67.
— leaf of tobacco in S. Africa, 76.
— top of beet, attenuation and restoration of virulence of virus of, 688; can infect *Phaseolus lunatus*, 219; infecting beans in U.S.A., 219, 556; (?) rhubarb in U.S.A., 430; occurrence in the Argentine, 562; in U.S.A., 162, 419, 688; study on, 419; susceptibility of bean varieties to, 556; transmission of, by *Eutettix tenella*, 419; to tomatoes, 562; varietal resistance to, 162.
(?) [Curly top] of spinach in Italy, 766.
— — of tomato, breeding against, 335; factors affecting, 210; losses caused by, 335; occurrence in the Argentine, 562; in U.S.A., 210, 335; transmission of, by *Dicyphus* and *Epitrix*, 562; by *Eutettix tenella*, 210, 419; by *Myzus persicae*, 562; by grafting, 210; not by *Agallia sticticollis*, 562; from beet, 562; study on, 335; varietal resistance to, 335.
Currants (*Ribes* spp.), *Cronartium ribicola* on, in Canada, 553; pine eradication against, in Norway, 136.
—, eradication of, see *Ribes* eradication.
—, leaf scorch of, in Denmark, 312; in Germany, 463.
—, *Mycosphaerella grossulariae* on, in Bulgaria, 475.
—, *Pseudopeziza ribis* on, in Germany, 799.
Cusisa, use of, against *Cercospora beticola* on beet, 348; against *Colletotrichum* on tobacco, 754; against *Plasmopara viticola* on vine, 764.
Cyclamen, *Cladosporium cyclaminis* on, in U.S.A., 460.
—, *Gloeosporium cyclaminis*, *Phyllosticta cyclaminis*, and *Septoria cyclaminis* on, in Germany, 650.
Cyclopeltella siccifolia, *Beauveria bassiana* on, 179.
Cyclops, *Blastulidiopsis chattoni* on eggs of, in France, 180.
Cydonia vulgaris, see Quince.
Cylindrocarpon album, serological studies on, 798.
— *radicicola* on *Gloxinia* in Holland, 767.
— — on lily in Holland, 243.
— — on *Narcissus* in Denmark, 460; in Holland, 243.
Cylindrosporium caryigenum, see *Mycosphaerella caryigena*.
— *chrysanthemi* on chrysanthemum in U.S.A., 224.
Cymbidium, *Hypochnus catonii* as a symbiont of, 317.
Cymbopogon citratus, streak disease of, in S. Africa, 67.
Cynara scolymus, see Artichoke.
Cynosurus cristatus, *Claviceps purpurea* in seed samples of, in Denmark, 304.
Cyphomandra betacea, *Phytophthora parasitica* on, in the Gold Coast, 696.
Cyranik, use of, against *Urocystis occulta* on rye and wheat bunt, 706.
Cyrtosis of cotton in China, 298.
Cystopus bliti on *Amaranthus retroflexus* in U.S.A., 75.
— *candidus* on horse-radish in Germany, 688.

[*Cystopus candidus*] on radish in Czecho-Slovakia and Germany, 490.
(?) *Cystospora batata* on sweet potato in U.S.A., 535.
Cytisus proliferus and *C. scoparius*, *Stereum purpureum* on, in New Zealand, 247.
Cytospora on apple in Canada and U.S.A., 186.
— on cottonwood in Canada, 137.
— on elm in U.S.A., 212.
— on mango in Ceylon, 223.
— on peach in Canada, 790.
— on plum in England, 61; in Holland, 767.
— on poplar in Canada, 137.
— *calvillae* on apple in Poland, 695.
— *capitata* on apple in Bulgaria, 745.
— *juglandina* on walnut in England, 79.
— *leucostoma* var. *cincta* on peach in Bulgaria, 745.
— *rubescens* on peach in Italy, 281.
Cytosporina ludibunda on apple, factors affecting, 52.
— *manninoi* on oak in Spain, 675.

Dactylis glomerata, *Bacterium* (*Phytomonas*) *rathayi* on, in Denmark, 304.
— —, *Claviceps purpurea* on, in Denmark, 304; in S. Africa, 231.
— —, *Puccinia graminis* on, in S. Africa, 231.
Dactylotenium aegyptiacum, streak disease of, in S. Africa, 67.
Daedalea quercina on chestnut in U.S.A., 275.
Daffodil, see *Narcissus*.
Dahlia, *Entyloma dahliae* on, in Austria, 244; in Czecho-Slovakia, 244, 624; in various countries, 244.
— colouring agent, toxicity of, to *Aspergillus fumigatus*, 715.
Dahmit, estimation of mercury in, 315.
—, use of, against beet diseases, 117; against *Pleospora graminea* on barley, *Urocystis occulta* on rye, and wheat bunt, 162; against *Ustilago avenae* on oats, 163.
Damping-off of beet, cucumber, and lettuce, in U.S.A., 589.
— of pine and other seedlings in U.S.A., 496.
Damson (*Prunus insititia*), *Clasterosporium carpophilum* on, in Uruguay, 226.
—, *Polystigma rubrum* on, in Europe and U.S.A., 660.
—, *Pseudomonas mors-prunorum* on, in England, 726.
Danatin xi, use of, against *Pleospora graminea* on barley, *Urocystis occulta* on rye, and wheat bunt, 162.
Daphne mezereum, *Marssonina daphnes* on, in France, Germany, and Holland, 109.
Darluca filum parasitizing *Uromyces betae* in the Ukraine, 91.
Dasyscypha calyciformis on *Abies balsamea*, *A. cephalonica*, *A. concolor*, *A. fraseri*, *A. grandis*, *A. nobilis*, *A. nordmanniana*, *A. pectinata*, and *A. sibirica* in Norway, 136.
— *calycina* on larch in England, 140.
[*Dasyscypha*] *fuscosanguinea* on pine in Norway, 136.
— *resinaria* on pine and *Pseudotsuga taxifolia* in Norway, 136.
— *subtilissima* on pine in Norway, 136.
Date palm (*Phoenix dactylifera*), *Acetobacter* on, in U.S.A., 384.
— —, *Alternaria* and *Aspergillus niger* on, and 'black nose' and brown blotch of, in U.S.A., 572.
— —, *Ceratostomella paradoxa* on, in U.S.A., 509, 572; in N. Africa, 510.
— —, *Citromyces ramosus* on, and decline of, in U.S.A., 572.
— —, *Diplodia phoenicum* on, in U.S.A., 571; *Macrophoma phoenicum* renamed, 571.
— —, 'dry bone' of, and *Graphiola phoenicis* and *Helminthosporium* on, in U.S.A., 572.
— —, (?) *Phoma* on, in France, Italy, N. Africa, and U.S.A., 572.
— —, *Phymatotrichum omnivorum* on, in U.S.A., 713.
— —, *Torula sacchari* on, in U.S.A., 572.
— —, yeasts on, in U.S.A., 384.
Datura stramonium, *Bacterium solanacearum* on, in S. Africa, 123.
— —, *Didymella lycopersici* can infect, 809.
— —, tobacco ring spot affecting, in U.S.A., 132.
— —, tomato aucuba mosaic can infect, 754.
— —, tomato spotted wilt can infect, 549; occurrence in S. Africa, 609.
— —, use of, in the separation of the viruses of tomato streak, 272.
Daucus carota, see Carrot.
Debaryomyces mucosus on man in France, 43.
'Decline' of date palm in U.S.A., 572.
Degeneration of potato, ecological factors in, 395, 531; occurrence in Austria, 743; in Germany, 65, 395, 531; in Portugal, 68; osmotic capacity in relation to, 743; study on, 395. (See also Virus diseases of.)
Delco oil, use of, in killing bananas affected with *Fusarium oxysporum cubense*, 585.
Delphinium, diseases of, in U.S.A., 649.
Dematium on apple in U.S.A., 656.
—, see also *Pullularia*.
Dendroctonus brevicornis and *D. frontalis* in relation to *Ceratostomella pini* on pine in U.S.A., 340.
Dendrol-Bordeaux, use of, against *Taphrina deformans* on peach, 519.
Dendryphium congestum on cacao in the Dominican Republic, 30.
Dermatomycetes, systematic position of, in the Gymnoascaceae, 575.
'Deuba' apparatus for the control of *Merulius lacrymans* in timber, 83.
Deuterophoma tracheiphila, action of ultra-violet rays on, 737.
— — on citrus in Italy, 174.
— — on lemon in Sicily, 175.
— — on orange in Italy, 174, 175.

Dewberry (*Rubus*), *Fusisporium rubi* on, in U.S.A., 727.
—, *Kunkelia nitens* on, in England and Wales, 423.
—, *Plectodiscella veneta* on, in U.S.A., 626, 662.
Diabrotica graminea, transmission of *Bacterium solanacearum* on Solanaceae by, in Porto Rico, 30.
'Diamond spot' of cotton fabrics in England, 241.
Dianthus caryophyllus, see Carnation.
— *tristis*, *Alternaria dianthi* and *Leptosphaeria dianthi* on, in Bulgaria, 475.
Diaporthe ambigua on pear in Holland, 95.
— *aristata* on birch in Norway, 136.
— *batatatis* on sweet potato in U.S.A., 535.
— *perniciosa* on apple, factors affecting, 52.
— — on fruit trees, legislation against, in Spain, 752.
— — on plum in Holland, 767.
— — on walnut in England, 79.
— *phaseolorum* on *Phaseolus lunatus* in U.S.A., 149.
— *vaccinii* on cranberry in U.S.A., 188; *Phomopsis vaccinii* pycnidial form of, 188.
Dibotryon morbosum on cherry and plum, legislation against, in the British Isles, 543.
Dictyophora multicolor on sugar-cane in Madagascar, 128.
Dictyuchus sterile on rice in Japan, 397.
Dicyphus transmitting curly top of beet to tomato in the Argentine, 562.
Didymaria, taxonomy of, 129.
Didymascella chamaecyparissi on *Chamaecyparis thyoides* in U.S.A., 140.
— *thujina* on *Thuja gigantea* in Holland, 96.
— — on *Thuja lobbii* in England, 22.
Didymella applanata on loganberry in England, 61.
— — on raspberry in Germany, 381; in Switzerland, 694.
— *lycopersici* can infect *Atropa belladonna*, chilli, *Datura stramonium*, eggplant, *Hyoscyamus niger*, *Lycium halimifolium*, *Nicandra physaloides*, *Petunia hybrida*, *Physalis francheti*, potato, *Solanum capsicastrum*, *S. dulcamara*, *S. nigrum*, and tobacco, 809.
— — on tomato, control, 483, 810; factors affecting, 809; occurrence in the Channel Islands, 494; in Germany, 483, 809; study on, 809; viability of, 810.
Didymellina macrospora on iris in England, 559.
Didymosphaeria oregonensis on alder in U.S.A., 139.
— *populina* on poplar in France and Italy, 137.
Die-back of apricot, control, 311; etiology of, 791, 792; occurrence in France, 23, 791; in S. Australia, 792; in Switzerland, 187; in Tasmania, 311; studies on, 187, 791.
[Die-back] of avocado pear in S. Africa, 311.
— of coffee in India, 368.
— of *Hevea* rubber in Ceylon, 400; in Java, 72, 539.
— of peach in France, 23.
Digitalis ferruginea, *Colletotrichum digitalis* on, in Hungary, 328; *Gloeosporium digitalis* renamed, 328.
Digitaria horizontalis, streak disease of, in S. Africa, 66; relation of, to maize streak, 67.
Dilophospora alopecuri on oats in Holland, 766.
Dinitrocresol, use of, as a timber preservative, 815.
Dinitrophenol as a constituent of thanalith and triolith, 85.
—, testing of, as a wood preservative, 84.
Dioscorea, see Yams.
Diospyros kaki, see Persimmon.
Diplachne eleusine, streak disease of, in S. Africa, 67.
Diplocarpon earliana on strawberry in U.S.A., 463.
— *rosae* on rose in England, 375; in Switzerland, 694.
(?) *Diplodia* on *Cinchona* in Java, 131.
—, *Physalospora zeicola* perfect stage of, 771.
— *adelinensis* on *Luffa acutangula* and *L. cylindrica* in the Philippines, 316.
— *guineae* on *Lolium perenne* in Spain, 329.
— *macrospora* on maize in the Philippines, 316; in Queensland, 157; (?) in Sierra Leone, 97; study on, 316.
— *musae* may be identical with *Botryodiplodia theobromae*, 190.
— *natalensis*, *D. phoenicum* regarded as distinct from, 571.
— — on citrus, control, 365, 508; factors affecting, 508; notes on, 570; occurrence in Jamaica, 26, 365, 508; in U.S.A., 570.
— — on grapefruit in U.S.A., 771.
— — on groundnut in U.S.A., 621.
— (?) — on mangosteen in England (on Burmese fruit), 62.
— — on orange in Peru, 226; in U.S.A., 771.
— *phoenicum* on date palm in U.S.A., 571; *Macrophoma phoenicum* renamed, 571.
— *puerariae* on *Pueraria thunbergiana* (?) in China, 544.
— *tubericola* on sweet potato in U.S.A., 535.
— *zeae* on maize, control, 39, 297, 498, 778; factors affecting, 448; occurrence in Kenya, 159; in Queensland, 157, 778; in Rhodesia, 39; in U.S.A., 297, 447, 498; studies on, 447, 498.
Diplodina agaves on *Agave americana* in Hungary, 328.
— *lini* on flax in Latvia, 784.
Diplosis in relation to *Didymella applanata* on raspberry in Germany, 381.
Discella carbonacea on *Salix caerulea* in England, 423.

Discomycetes, monograph of the inoperculate, 606.
—, sexual function of microconidia in, 665.
Dog, *Eidamella actoni* on the, in India, 716.
—, *Torula epizoa* on the, in Russia, 241.
Dolichos, *Cercospora cruenta* on, 130.
— *biflorus*, virus disease of, in India, 150.
— (?) *lablab*, *Cercospora dolichi* on, in Italian Somaliland, 475.
— —, mosaic of, in India, 224.
— —, virus disease of, in India, 150.
Dormant oil 4840, see Oil, Dormant.
Dothichiza populea on poplar in Belgium, 338; in Germany, 138, 338.
Dothidea pomigena synonym of *Gloeodes pomigena*, 657.
Dothidella agrostidis synonym of *Scirrhia agrostidis*, 722.
— *ulei* on *Hevea* rubber, legislation against, in Dutch E. Indies, 608.
Dothiorella ribis, see *Botryosphaeria ribis*.
Dritomic sulphur, toxicity of, to *Sclerotinia americana*, 385.
Drought spot of plum in S. Africa, 521.
'Dry bone' of date palm in U.S.A., 572.
Dry mix sulphur lime, see Sulphur lime, dry mix.
Dry rot of beet in Germany, 559; in Holland, 148; in Poland, 149; relation of boron deficiency to, 147; of soil alkalinity to, 149. (See also *Phoma betae*.)
Dryopteris crassirhizoma, *Milesina miyabei* on, in Japan, 813.
— *dilatata* and *D. monticola*, *Uredinopsis ossaeiformis* on, in Japan, 813.
— *thelypteris*, *Uredinopsis hirosakiensis* on, in Japan, 813.
— *viridescens*, *Milesina dryopteridis* on, in Japan, 813.
Du Bay 655 and 665 dusts, composition of, and use of, against *Ustilago avenae* and *U. kolleri* on oats, 634.
— — 664 and 694 dusts, use of, against *Actinomyces scabies* on potato, 259.
— — 738 dust, composition of, 491.
— — — —, use of, against *Actinomyces scabies* on potato, 259; against *Corticium solani* on lettuce, 491.
— — 965 D, 971 A, and 971 C dusts, use of, against *Gibberella moniliformis* on cotton, 430.
— — preparations, use of, against *Gibberella moniliformis* on cotton, 454.
'Dustejecta' dusting machine, 801.
Dusting apparatus, 454, 801; French exhibition of, 247.
— injury, 421, 494.
— versus spraying against *Microsphaera quercina* on oak, 682; against *Venturia inaequalis* on apple, 788.
— — steeping against pea diseases, 17; against wheat bunt, 706.
Dwarf disease of mulberry in Japan and Russian Central Asia, 756.
— — of rice in Japan, 324.
— — of strawberry, Actinomycete in relation to, in Holland, 250; attributed to *Aphelenchus fragariae* in U.S.A., 380.
[Dwarf disease] of sugar-cane in Queensland, 326, 472.
Dyes, aniline, constitution of, in relation to fungicidal action, 664.
—, —, permeability of grass and oat seeds to, 723.
—, —, toxicity of, to *Penicillium*, *P. brevicaule*, *P. candidum*, and *P. luteum*, 716; to phytopathogenic micro-organisms, 525.
—, —, use of adhesives with, 664; use of, against *Plasmopara viticola* on vine, 221, 622, 663; in the identification of *Fusarium*, 119.
Dying-off of beech in Canada, 410.
—, see also Die-back.
Dysdercus transmitting *Nematospora coryli* on cotton in Rhodesia, 638.

Earlea, a section of *Phragmidium*, 405.
Eau de Javelle, use of, against *Gloeodes pomigena* on oranges, 105.
Echinodontium tinctorium on *Abies* and *Tsuga heterophylla* in Canada, 614.
Eggplant (*Solanum melongena*), *Aecidium* on, in Madagascar, 699.
—, *Bacterium solanacearum* on, in Porto Rico, 29; in S. Africa, 123.
—, *Cercospora* on, in Malaya, 354.
—, *Colletotrichum capsici* on, in Malaya, 354.
—, *Didymella lycopersici* can infect, 809.
— diseases in U.S.A., 617.
—, *Mucor abundans* on, in U.S.A., 554.
—, — *hiemalis* can infect, 554.
—, *Oidiopsis* on, in Cyprus, 696.
—, *Phomopsis vexans* on, in U.S.A., 356.
—, *Rhizopus arrhizus* and *R. fusiformis* can infect, 554.
—, — *nodosus* on, in U.S.A., 554.
—, *Sclerotium rolfsii* on, in Ceylon, 223; in U.S.A., 349.
—, *Vermicularia capsici* on, see *Colletotrichum capsici* on.
—, *Verticillium albo-atrum* on, in Bulgaria, 745; in U.S.A., 626.
Eggs, *Verticillium monosporioides* on, in Italy, 641.
Eidamella actoni on the dog in India, 716.
Eleocharis tuberosa, *Ceratostomella adiposum* on, (?) in China, 544.
Eleusine aegyptiaca, *Helminthosporium leucostylum* and *H. nodulosum* on, in India, 426.
— *coracana*, *Helminthosporium leucostylum* on, in India, 426; in Uganda, 353.
— —, — *nodulosum* on, in India, 426.
— —, *Ustilago eleusinis* on, in India, 158.
— *indica*, streak disease of, in S. Africa, 66; distinct from streak of maize and sugar-cane, 67.
Elfvingia brownii renamed *Ganoderma applanatum* var. *brownii*, 11.
Elm (*Ulmus*), *Botryodiplodia hypodermia* on, in U.S.A., 212.
—, — *ulmicola* on, in U.S.A., 212; *Sphaeropsis ulmicola* renamed, 212.

[Elm], *Cephalosporium* on, in U.S.A., 213.
—, *Ceratostomella ulmi* on, common name of disease caused by, 611; control, 13, 138, 275, 409, 483, 810; earliest record of, 610; factors affecting, 13, 274, 275, 337; host range of, 275; legislation against, in Austria, 416; in the British Isles, 544; in Germany, 208, 272, 274, 275, 415, 607; (proposed) 13; in Norway, 136; in Spain, 752; in various countries, 336; losses caused by, 96; notes on, 13, 14, 95, 274, 275, 336, 551, 810; occurrence in Austria, 416, 755; in England, 336; in France, 95, 409, 551, 610; in Germany, 13, 14, 208, 272, 274, 275, 336, 415, 607; in Holland, 96, 138, 336, 484; in Italy, 766, 810; in Rumania, 156; in Switzerland, 483; perfect stage of *Graphium ulmi*, 409; review of work on, 336; studies on, 410, 484; transmission of, by *Scolytus*, 14, 138, 275, 337, 409, 483, 484; specific and varietal resistance to, 95, 96, 138, 274, 336, 484, 485, 766, 810; viability of, 484.
—, *Cytospora* on, in U.S.A., 212.
— diseases, legislation against, in S. Africa, 208.
—, *Fomes ulmarius* on, in England, 614.
—, *Phomopsis* and *Physalospora cydoniae* on, in U.S.A., 212.
—, *Verticillium albo-atrum* on, in U.S.A., 755.
—, (?) virus disease of, in U.S.A., 410.
Elosal neu, use of, against *Cladosporium fulvum* on tomato in Holland, 767.
Elsinoe, *Melanobasidium* and *Plectodiscella* synonyms of, 724.
— *canavaliae* on *Phaseolus lunatus* in Cuba, 619.
— *ledi* on *Ledum glandulosum* and *L. groenlandicum* in U.S.A., 184.
— *piri* on apple and pear in Europe, 723; synonymy of, 724.
— *veneta*, *Plectodiscella veneta* renamed, 724.
Emilia flammea, pineapple yellow spot virus affecting, in Hawaii, 586; relation of, to pea streak, 218.
Empoasca fabae, transmission of bean mosaic by, in U.S.A., 417; of potato leaf roll and tomato mosaic by, in U.S.A., 531.
Empusa fresenii on *Aphis sacchari* in the Philippines, 640.
Enantiothamnus, note on, 642.
Endive (*Cichorium endivia*), *Sclerotinia* (?) *sclerotiorum* on, in Holland, 767.
Endodermophyton tropicale, see *Trichophyton concentricum*.
Endothia fluens, note on, 611.
— *gyrosa* ascigerous stage of *Endothiella gyrosa*, 611.
— *parasitica* on chestnut, legislation against, in the British Isles, 543; in Spain, 752; notes on, 160; occurrence in U.S.A., 160, 275; utilization of timber infected by, 275.
Endothiella (?) *gyrosa* can infect almond, chestnut, and *Eucalyptus diversicolor*, 611.
— (?) — on oak in Spain, 611.
Entomogenous fungi of the British Isles, 573.
Entomophthora sphaerosperma on *Pieris brassicae* in Poland, 456.
— — on *Rhopobota vacciniana* in U.S.A., 371.
Entostroma oryzae, *Sclerotium phyllachoroides* identical with, 801.
Entyloma dahliae on dahlia in Austria, 244; in Czecho-Slovakia, 244, 624; in various countries, 244.
Enzymoids, viruses classed as, 592.
Enzymology, collected papers on various aspects of, 388.
Epichloe typhina on grasses in Esthonia, 25.
Epicoccum cocos on coco-nut in the Philippines, 780; *Promecotheca cumingii* in relation to, 780.
— (?) *heterochroum* in butter in Holland, 374.
— *neglectum* on jute in Russian Central Asia, 183.
— *purpurascens*, action of luminous and ultra-violet rays on, 737.
— — on citrus in S. Africa, 638.
— — on cotton in Rhodesia, 638.
Epidendrum, asymbiotic germination of, in Jamaica, 388.
Epidermophyton on man in the Argentine, 43.
— *floccosum* on man, factors affecting, 575; note on, 575; occurrence in China, 44, 458; in Porto Rico, 646.
— *inguinale*, see *E. floccosum*.
— *interdigitale* synonym of *Trichophyton rubrum*, 44; hyphal fusions in, as an aid to identification, 458.
— *salmoneum* synonym of *Trichophyton rubrum*, 44.
Epilobium angustifolium, *Pucciniastrum chamaenerii* on, in France, 339.
Epitrix transmitting curly top of beet to tomato in the Argentine, 562.
— *cucumeris* in relation to potato leaf roll in U.S.A., 531.
Equines, *Cryptococcus farcinimosus* on, (?) in Italy, 641.
Equisetum, *Gibberella saubinetii* on, in Germany, 581.
Ergotinin and ergotoxin, production of, by *Claviceps purpurea* in culture, 38.
Erigeron canadensis, (?) aster yellows on, in U.S.A., 521.
Eriobotrya japonica, see Loquat.
Eriophyes calcladophorus in relation to bacterial rot of tomato in Algeria, 809.
— *fici*, transmission of fig diseases by, in U.S.A., 522.
— *ribis*, *Cephalosporium* (*Acrostalagmus*) *eriophytis* on, 179.
Eriosoma lanigerum, relation of, to *Gloeosporium perennans* on apple in Canada, 248; in U.S.A., 5, 656.
Erwinia sacchari, see *Bacillus sacchari*.

Erysimors dust, use of, against *Microsphaera quercina* on oak, 682.
Erysiphaceae in India, 545.
— on *Plantago major*, *Cicinnobolus cesatii* parasitizing, in U.S.A., 377.
—, phenology of, in Austria, 799.
Erysiphe cichoraccarum, *Cicinnobolus cesatii* parasitizing, in U.S.A., 377.
— — on *Ambrosia artemisiifolia* in U.S.A., 377.
— — on cantaloupe in U.S.A., 28.
— — on cucumber in England, 680; in U.S.A., 152.
— — on cucurbits in Cyprus, 696.
(?) — — on mango in Jamaica, 625.
— — on melon in Cyprus, 696.
— — on tobacco, control, 333; occurrence in Guatemala, 431; in Java, 333; in Rhodesia, 677.
— — on zinnia in U.S.A., 377.
— *graminis*, effect of ultra-violet rays on, 166.
— on barley in Czecho-Slovakia, 157; in Germany, 102.
— — on rye in Czecho-Slovakia, 157.
— — on wheat in Czecho-Slovakia, 157; in New Zealand, 32.
— —, toxicity of sulphur dust to, 195, 730, 731.
— *malachrae* on cotton in Peru, 225, 511; *Ovulariopsis gossypii* (?) conidial stage of, 512.
— — on *Malachra capitata* in Porto Rico, 512.
— *polygoni* on bean, control, 28, 346; notes on, 19; occurrence in Bermuda, 97; in U.S.A., 19, 28, (?) 346; specialization in, 19; study on, 346; varietal resistance to, 346.
— — on clover, breeding against, 499; *Cicinnobolus cesatii* parasitizing, 377; occurrence in Canada, 246; in U.S.A., 377, 499; varietal resistance to, 246.
— — on melon in France, 94.
— — on peas in U.S.A., 28.
— — on soy-bean in U.S.A., 19.
— — on sweet pea in U.S.A., 224.
Erythrina, *Fusarium* on, in Costa Rica, 369.
—, *Rosellinia bunodes* on, in St. Lucia, 26.
—, — *pepo* on, in St. Lucia, 26, 698.
— *lithosperma*, diseases of, in Ceylon, 601.
— —, *Fomes lamaoensis* on, in Java, 72.
Eschscholzia californica, *Colletotrichum circinans* can infect, 392.
Esters, ethyl alcohol, and ethyl ether, effect of, on growth of moulds, 63.
Ethyl mercury chloride as a constituent of ceresan, K-1-C, and K-1-D dusts, 634.
— — —, use of, against *Bacterium marginatum*, *Fusarium oxysporum* var. *gladioli*, and *Septoria gladioli* on gladiolus, 356; against mould and sap stain of timber, 816.
— — compounds, fungicidal use of, in U.S.A., 733.
— — phosphate as a constituent of Du Bay 655 and 665 dusts, 634; of Du Bay 738 dust, 491.
[Ethyl mercury phosphate], use of, against mould and sap stain of timber, 816.
Ethylene dibromide, use of, against *Cladosporium fulvum* on tomato, 211.
— gas, use of, against stem end rot of citrus, 509.
Etymalos, use of, against *Merulius lacrymans* on timber, 217.
Eucalyptus, *Phyllosticta* and *Sphaerulina eucalypti* on, in S. Africa, 268.
— *diversicolor*, *Endothiella* (?) *gyrosa* can infect, 611.
Euchlaena luxurians, *Sclerospora sacchari* can infect, 425.
— *mexicana*, *Sclerospora graminicola* and *S. sorghi* can infect, 635.
Euphorbia and *E. cyparissias*, *Uromyces pisi* on, in Germany, 760.
— *pulcherrima*, curl disease of, in Germany, 302.
Euphragmidium a section of *Phragmidium*, 405.
Eurya japonica and *E. ochracea*, *Limacinia japonica* on, in Japan, 329.
Eutettix tenella, method of studying the ejections of, during feeding, 619.
— —, transmission of beet curly top by, in U.S.A., 419; of tomato curly top by, in U.S.A., 210, 335.
Exanthema of citrus in S. Africa, 105.
Exobasidium oxycocci on cranberry in U.S.A., 188; *E. vaccinii* (?) synonym of, 188.
— *vaccinii* on cranberry in U.S.A., 188.
— *vexans* on tea in Indo-China, 433.

Factory exhalations causing plant injury in Belgium, 198.
Fagus, see Beech.
Falkamesam process for timber preservation, 216, 685.
'Falling' disease of tulip in Denmark, 460.
'Faltenzwerg' of tobacco, (?) identical with 'kroepoek' (leaf curl), 478.
Ferric chloride, use of, against pecan rosette, 684; for detecting injuries to citrus fruit, 236.
— nitrate, use of, against chlorosis of apple and cottonwood, 811.
— sulphate, use of, against pecan rosette, 684.
Ferrous sulphate, toxicity of, to *Poria hypolateritia*, 749.
— —, use of, against brusone of rice, 262; against chlorosis of apple and cottonwood, 811; against gummosis of fruit trees, 660; against pecan rosette, 684. (See also Iron sulphate.)
Ferrox sulphur, toxicity of, to *Sclerotinia americana*, 385.
— —, use of, against *Venturia inaequalis* on apple, 520.
Fertilizers, effect of, on *Actinomyces scabies* on potato, 321, 597; on *Armillaria mellea* on walnut, 95; on *Bacterium tumefaciens* on *Pelargonium*, 358; on banana leaf fall, 585; on brown heart of turnip, 276; on brusone of rice, 262; on bunchy top of *Musa textilis*,

300; on *Ceratostomella ulmi* on elm, 275; on *Cercospora beticola* on beet, 19; on chlorosis of citrus, 571; on *Clasterosporium carpophilum* on cherry and peach, 799; on copper deficiency disease of fruit trees, 724; on *Didymella applanata* on raspberry, 382; on *D. lycopersici* on tomato, 809; on *Fusarium* on conifers, 413; on *F. vasinfectum* on cotton, 160, 638, (?) 699; (?) on *Crotalaria juncea*, 107; on pigeon pea, 425; on *Glomerella cingulata* on coffee, 159; on grey speck of cereals, 768; of oats, 363; on heart necrosis of potato, 535; on *Helicobasidium purpureum* on rhubarb, 691; on *Helminthosporium ocellum* on sugar-cane, 4; on *H. sativum* on wheat, 504; on leaf scorch of currants, 312; of fruit trees, 57; on leaf spotting of apple, 115; on mosaic of cassava, 153; on mottle leaf of citrus, 571; on *Ophiobolus graminis* on wheat, 567; on *Phyllosticta colocasiae* on coco-yams, 696; on physiological blackening of potato, 93; on physiological breakdown of apple, 53; on *Plasmodiophora brassicae* on cabbage, 357; on crucifers, 146, 415, 555; on *Plasmopara viticola* on vine, *Podosphaera leucotricha* on apple, and *Pseudopeziza ribis* on currants, 799; on *Puccinia anomala* on barley, 98; on *P. glumarum* on wheat, 98, 704; on *P. graminis* on wheat, 98, 287, 503, 704; on *P. lolii* on oats and *P. secalina* on rye, 98; on *P. triticina* on wheat, 704; on *Pythium aphanidermatum* on sugar-cane, 540; on reclamation disease of barley, clover, lucerne, oats, swedes, and turnips, 767; on root rot of coco-yams, 764; on rosette of pecan, 684; on 'rust' of cotton, 160, 638; on *Septoria graminum* on wheat, 709; on *S. nodorum* on wheat, 445; on soil fungi, 803; on *Sphaerotheca mors-uvae* on gooseberry and *S. pannosa* on rose, 799; on *Stereum purpureum* on plum, 59; on tea yellows, 806; on tobacco brown root, 9; on tobacco frenching, 7; on tomato stripe, 10; on *Uncinula necator* on vine, 799; on *Venturia inaequalis* on apple, 49; on wheat bunt, 565.

Festuca, effect of germisan on seeds of, 722.

—, permeability of seeds of, to certain dyes, 723.

— *ovina*, *Phyllachora sylvatica* on, in France, 722.

— *pratensis*, *Claviceps purpurea* in seed samples of, in Denmark, 304.

Ficus, *Fomes lignosus* on, in the Belgian Congo, 2.

—, — *pachyphloeus* on, in the Philippines, 613.

— *carica*, see Fig.

— *hauili*, *Scorias philippinensis* on, in the Philippines, 547.

— *hochstetteri*, *Herpetomonas ganorae* in, in Eritrea, 613.

[*Ficus*] *magnolioides*, *Sclerotinia sclerotiorum* and *Tuberculavia fici* on, in U.S.A., 313.

Fig (*Ficus carica*), (?) *Candida* on, in Cyprus, 696.

—, *Cerotelium fici* on, in India, 282.

— diseases in U.S.A., 522; transmission of, by *Cheyletus*, *Eriophyes fici*, *Frankliniella tritici*, *F. t.* var. *californicus*, *Heliothrips fasciatus*, *Leptothrips mali*, *Liothrips ilex*, *Sejus pomi*, and *Thrips bremneri*, 522.

—, (?) *Glomerella cingulata* can infect, 313.

—, *Kuehneola fici* on, see *Cerotelium fici*.

—, *Phyllosticta ficicola* on, in S. Africa, 268.

Fiji disease of sugar-cane in New S. Wales, 541; in the Philippines, 203; in Queensland, 327; transmission of, (?) by *Trionymus sacchari*, 327; varietal susceptibility to, 541.

Filosité of potato in Portugal, 68.

Fir, see *Abies*.

Fish oil, use of, with Bordeaux mixture, 497.

— — and hydrated lime, use of, against *Venturia inaequalis* on apple, 161.

— — soft soap, use of, in tests of amount of fluid needed for spraying apple trees, 523.

Flax (*Linum usitatissimum*), *Ascochyta linicola* on, in Russia, 647.

—, *Asterocystis radicis* on, in Belgium, 182.

—, *Botrytis cinerea* on, in Latvia, 784.

—, *Diplodina lini* on, in Latvia, 784.

— diseases, control in Holland, 96.

—, *Fusarium lini* on, in the Argentine, 300; in U.S.A., 182.

—, *Melampsora lini* on, in the Argentine, 300.

—, *Phlyctaena linicola* on, in the Argentine, 300; (?) in Siberia, 45.

—, *Phoma exigua* on, in Esthonia, 25.

—, *Polyspora lini* on, in Latvia, 784.

—, *Pythium megalacanthum* on, note on, 182; occurrence in Holland, 578.

—, *Sclerotinia sclerotiorum* on, in Russia, 45.

—, see also Linseed.

Flies, *Cephalosporium dipterigenum*, *C.* (*Acrostalagmus*) *muscarium*, and *Hymenostilbe muscarium* on, in England, 241.

—, mixing of pycnidial nectar of rusts by, 262.

Florida scaly bark of orange in China, Mexico, the Philippines, and U.S.A., 365; nail head rust of fruit identical with, 365.

Flotate sulphur, see Sulphur, flotate.

Flour, *Claviceps purpurea* in, medical aspects of, 103.

—, use of, as a spreader, 381, 587.

Fluorides, use of, as timber preservatives, 815.

Fluralsil, use of, against *Merulius lacrymans* and *Poria vaporaria* on timber, 84.

Foliocellosis of citrus in Jamaica, 26.

Fomes on oil palm in Malaya, 769.

[*Fomes*] *annosus*, *Oedocephalum* conidial stage of, 82, 145.
— — on *Chamaecyparis thyoides* in U.S.A., 140.
— — on conifers in Canada, 615.
— — on pine in Germany, 82, 145.
— — on *Pseudotsuga taxifolia* in Germany, 141; in U.S.A., 615.
— —, toxicity of coal-tar creosote fractions to, 758.
— —, use of, in tests of timber preservatives, 84, 487.
— *connatus* on *Acer platanoides*, beech, lime, *Platanus*, and poplar in Norway, 137.
— *fomentarius* on beech in Austria, 81.
— *fulvus* on peach in France, 23.
— *lamaoensis* on *Artocarpus* in Java, 72.
— — on coffee in India, 367; in Java, 72.
— — on *Erythrina lithosperma* in Java, 72.
— — on *Hevea* rubber, control, 2, 72; hosts of, 72; occurrence in the Belgian Congo, 2; (?) in Indo-China, 432; in Java, 72.
— — on kola nut in Sierra Leone, 97.
— — on *Leucaena glauca* in Java, 72.
— (?) — on oil palm in Malaya, 105.
— *laricis* on *Abies sachalinensis* and larch in Japan, 614.
— — on pine in Canada, 614.
— — on *Pseudotsuga taxifolia* in Canada, 614; in U.S.A., 615.
— — on timber in Canada, 614.
— *lignosus* on cacao and *Ficus* in the Belgian Congo, 2.
— — on *Hevea* rubber, control, 2, 72; factors affecting, 672; notes on, 2, 72; occurrence in the Belgian Congo, 2; in Ceylon, 400; in Java, 72; in Malaya, 2, 672, 744; in Sumatra, 72.
— — on *Leucaena glauca* in the Belgian Congo, 2.
— — on oil palm in Malaya, 769.
— — on tea in Malaya, 768.
— *nigro-laccatus* on oak in Russia, 680.
— *pachyphloeus* on *Albizzia procera*, *Ficus*, *Hopea acuminata*, and *H. philippinensis* in the Philippines, 613.
— (?) — on oil palm in Malaya, 105.
— — on *Parashorea malaanonan*, *Parkia javanica*, *Pentacme contorta*, *P. mindanensis*, *Rhizophora candelaria*, *R. mucronata*, *Shorea*, *S. guiso*, and timber in the Philippines, 613.
— *pinicola* on *Abies firma* and pine in Japan, 614.
— — on timber in Canada, 614.
— — on *Tsuga sieboldi* in Japan, 614.
— *pseudoferreus*, see *Ganoderma pseudoferreum*.
— *robustus* on *Abies sachalinensis* and *Thujopsis dolabrata* in Japan, 812.
— *roseus* on conifers in Canada, 615.
— — on *Pseudotsuga taxifolia* in Canada, 615; in U.S.A., 615.
— — on timber, factors affecting, 488.
(?) — *ulmarius* on *Abelicea hirta*, *Aphananthe aspera*, camphor, and *Celtis sinensis* in Japan, 614.
[*Fomes ulmarius*] on *Cryptomeria japonica* in Japan, 614, 616.
— — on elm in England, 614.
— *vegetus* on *Acer pictum*, birch, beech, oak, *Salix urbaniana*, and *Tilia japonica* in Japan, 12.
— — regarded as a form of *Ganoderma applanatum*, 11.
— — var. *leucostratus* on oak in Japan, 12.
Food investigation, index to the literature of, 734.
Forest pathology, American text-book of, 211; Russian text-book of, 78.
— trees, Russian manual on seedling diseases of, 483.
Formaldehyde as a constituent of corona oat dust, kantsmut, and smuttox, 634; of havre-fusariol, 163.
— as a soil disinfectant, 589.
—, *dosis tolerata* of, for tomato seed, 483.
—, effect of, on wheat seedlings, 169.
—, factors affecting germination of seed-grain treated with, 773.
— injury to cereal seed-grain, 634.
—, preservative action of, 466.
—, toxicity of, to *Phymatotrichum omnivorum*, 370.
—, use of, against *Actinomyces scabies* on potato, 671; against *Bacterium tabacum* on tobacco, 807; against *Bact. tumefaciens* on apple, 47; on raspberry, 428; against *Cladosporium cucumerinum* on cucumber, 688, 690; against *Colletotrichum* on tobacco, 754; against *Corticium solani* on potato, 260, 468, 671; on tomato, 409; against *Cylindrocarpon radicicola* on lily, 243; against damping-off of seedlings, 253, 496; against *Fusarium* on *Narcissus*, 376; against *F. oxysporum cubense* on banana, 25; against *Mycogone perniciosa* on mushrooms, 493; against *Mystrosporium* on *Cicer arietinum*, 425; against *Narcissus* diseases, 786; against *Phoma apiicola* on celery, 91; against *Phymatotrichum omnivorum* on date palm, 713; against *Phytophthora infestans* on potato, 494; (?) on tomato, 78; against *P. parasitica nicotianae* on tobacco, 750; against *Plasmodiophora brassicae* on crucifers, 146; against (?) *Pythium artotrogus* on celery, 91; against *P. de Baryanum* on cucumber, 350; against *P. ultimum* on tomato, 409; against *Rhizoctonia* on cucumber, 350; against root rot of sorghum, 507; against *Sclerotinia minor* on lettuce, 492; against *Sclerotium perniciosum* and *S. tuliparum* on tulips, 376; against *Septoria apii* on celery, 92; against *Sphacelotheca cruenta* and *S. sorghi* on sorghum, 235; against timber-rotting fungi, 83; against *Urocystis occulta* on rye, 706; against *Ustilago avenae* on oats, 35, 163, 290, 634; against *U. hordei* on barley, 505; against *U. kolleri* on oats, 634; against *U. panici-miliacei* on *Panicum miliaceum*, 566; against wheat bunt, 35, 232, 289, 290, 442, 566, 706.
—, hot, use of, against *Actinomyces scabies*

on potato, 259, 671 ; against *Corticium solani* on potato, 671.
[Formaldehyde] vapour, use of, against *Cladosporium cucumerinum* on cucumber, 691 ; against *Cladosporium fulvum* on tomato, 211 ; for seed-grain disinfection, apparatus for, 290.
Fragaria californica and *F. cuneifolia*, *Corticium solani* on, in U.S.A., 661.
— *vesca*, see Strawberry.
Frankliniella transmitting virus of tomato spotted wilt on tobacco in S. Africa, 609.
— *insularis* transmitting spotted wilt of tomato in Australia, 78, 549.
— *tritici* and its var. *californicus*, transmission of fig diseases by, in U.S.A., 522.
Fraxinus, see Ash.
Freesia, *Sclerotinia gladioli* on, in Holland, 767 ; in N. America, 665 ; ascigerous stage of *Sclerotium gladioli*, 666.
—, virus disease of, in England, 591.
Frenching of tobacco in S. Rhodesia confused with leaf curl, 676 ; in U.S.A., 7, 807 ; thallium toxicity in relation to, 807.
'Friend' motor spraying apparatus, 196.
Fritillaria, fungus (?) symbiont in seeds of, in Italy, 387.
Fruit diseases in Tunis, 153 ; control of, in France, 246, 654, 655.
Fumago vagans synonym of *Caldariomyces fumago*, 404.
Fungi, list of, in Bulgaria, 745 ; in Chile, 474 ; in China, 545, 674 ; in Cyrenaica, 458 ; in the Dominican Republic, 604 ; in Eastern Asia, 268 ; in Formosa, 205 ; in India, 545 ; in Iowa, 804 ; in Manitoba, 546 ; in N. America, 405 ; in Northern Ireland, 746 ; in the Orange Free State, 267 ; in the Philippines, 129, 268, 455 ; in Rumania, 605 ; in Russia, 76 ; in Siberia, 268 ; in S. America, 546 ; in Spain, 604 ; in Trinidad, 474 ; in West Indies, 328.
—, —, see also Plant diseases, Rusts.
—, method of making preparations of cultures of, 795.
—, — of observing spore formation in, 197.
—, physiological characterization of species of, 736.
Fungicides, precision of spore germination tests in investigations on, 729.
—, testing of, in the field, 64 ; in the laboratory, 729.
Furfural dusts, use of, against *Diplodia zeae*, *Gibberella saubinetii*, and *Nigrospora sphaerica* on maize, 297.
Fusariol, use of, against *Calonectria graminicola* on rye, 777 ; against flax diseases, 784.
Fusarium, action of, on cellulose, 800.
—, biochemistry of, 119.
— can infect beans, 369.
— in relation to diamond spot of cotton fabrics, 241.
— in soil in Russia, 709 ; in U.S.A., 264.
[*Fusarium*] on *Abutilon avicennae* in Russian Central Asia, 183.
— on *Apocynum venetum* in Russian Central Asia, 182.
— on apple, factors affecting, 52 ; occurrence in U.S.A., 656.
— on apricot in France, 23 ; in Switzerland, 187.
— on *Asclepias* in India, 158.
— on aster (China) in Czecho-Slovakia, 624 ; in Germany, 718.
— on banana, legislation against, in Spain, 752 ; occurrence in Brazil, 728 ; in England (on S. American fruit), 189 ; in Italian Somaliland, 765 ; study on, 189.
— on barley in Canada, 293, 294.
— on cereals, control, 624 ; notes on, 624 ; occurrence in Czecho-Slovakia, 624 ; in Germany, 559 ; in New S. Wales, 503 ; in Russia, 709.
— on chilli in India, 426.
— on *Cicer arietinum* in India, 425.
— on *Cinchona* in Indo-China, 433.
— on clover, action of luminous rays on, 737.
— on coffee in Costa Rica, 369.
— on *Colocasia antiquorum* in the Gold Coast, 763.
— on conifers in England, 413.
— on cotton in Uganda, 353.
— on *Crotalaria juncea* in India, 282.
— on *Erythrina* and *Gliricidia* in Costa Rica, 369.
— on *Hevea* rubber in Indo-China, 432.
— on hops in England, 127 ; (?) imperfect stage of *Gibberella*, 127.
— on *Inga* in Costa Rica, 369.
— on lentils in Russia, 282.
— on lily in Holland, 243.
— on locusts in Russia, 42.
— on maize in Kenya, 39, 163.
— on *Narcissus*, control, 376, 699 ; factors affecting, 786 ; occurrence in Holland, 376 ; in U.S.A., 699, 786 ; varietal resistance to, 786.
— on oats in Russia, 282.
— on onion in Canada, 278.
— on papaw in Peru, 226.
— on pineapple, legislation against, in Spain, 752.
— on potato, legislation against, in Portugal, 272 ; occurrence in India, 126 ; in Kenya, 67.
— on rye in Germany, 775.
— on sorghum in U.S.A., 507.
— on soy-bean in Russian Central Asia, 316 ; in Siberia, 88.
— on strawberry in Canada, 251 ; in U.S.A., 771.
— on sugar-cane, as the cause of pokkah boeng, 266, 403 ; occurrence in the Philippines, 266. 403 ; in U.S.A., 543 ; varietal susceptibility to, 543.
— on timber in the Transvaal, 684.
— on tomato in Esthonia, 25 ; in Trinidad, 610.
— on vegetables in U.S.A., 554.
— on vine in Russian Central Asia, 316.
— on wheat, control, 569 ; mixed inocu-

lations with, 708; notes on, 291, 294; occurrence in Australia, 709; in Canada, 291, 294; in England, 623; in Kenya, 163; in Sweden, 568.
[*Fusarium*] on *Xanthosoma sagittifolium* in the Gold Coast, 763.
—, Russian review of work on the genus, 709.
—, serological studies on, 798.
—, use of aniline dyes in identification of, 119.
—, variation in, 477.
— *anguioides* on peas in Japan, 17.
— *angustum* on cotton in Egypt, 513.
— *arcuosporum* on wheat in Russia, 709.
— *arthrosporioides* on peas in Japan, 17.
— — on rice in Bulgaria, 745.
— — on wheat in Russia, 709.
— (?) *aurantiacum* on maize in (?) Austria and Czecho-Slovakia, 234.
— *avenaceum* on oats in England, 623.
— *batatatis*, effect of irradiation on growth of, 593.
— — on sweet potato in U.S.A., 535.
— *betae* synonym of *F. merismoides* var. *majus*, 624.
— *coeruleum* on potato in Norway, 669.
— *conglutinans*, H-ion relations of, 28.
— — on Brussels sprouts, cauliflower, cabbage, and kale in U.S.A., 490.
— —, serological studies on, 798.
— — var. *callistephi* on aster (China) in Canada, 244; in Czecho-Slovakia, 624; in Italy, 375; in U.S.A., 302; varietal resistance to, 244, 302.
— *cubense*, regarded as a form of *F. oxysporum* (q.v.), 281.
— *culmorum* on barley in England, 632; in Germany, 444.
— — on bean in Bulgaria, 745.
— — on hyacinth in Denmark, 460.
— — on maize in U.S.A., 569.
— — on oats in England, 623, 632.
— — on potato in Rhodesia, 67.
— — on rice in Bulgaria, 745.
— — on rye in Lithuania, 632.
— — on tobacco in Bulgaria, 745.
— — on wheat, control, 632; factors affecting, 291; histological effects of, 293; occurrence in Australia, 709; in Bulgaria, 745; in Canada, 293; in England, 632; in Germany, 444; in Lithuania, 632; studies on, 632, 709.
— (?) *dianthi* on carnation in Denmark, 768.
— *dimerum* on wheat in Russia, 709.
— *discolor*, H-ion relations of, 28.
— (?) *elegans* on *Narcissus* in Denmark, 460.
— *eumartii* on coffee in Tanganyika, 712.
— *fructigenum* regarded as a var. of *F. lateritium*, 306.
— *heterosporum* wrongly considered the cause of 'bakanae' disease of rice, 399.
— *hyperoxysporum* on sweet potato in U.S.A., 535.
— *lateritium* on walnut in Germany, 339.
— —, physiological specialization in, 306.
[*Fusarium lateritium*] var. *fructigenum*, *F. fructigenum* referred to, 306.
— — — — on apple, 52, 307.
— — — —, physiological specialization in, 306.
— — var. *longum* on coffee in Tanganyika, 712.
— — var. *mori*, see *Gibberella baccata* var. *moricola*.
— *lini* on flax in the Argentine, 300; in U.S.A., 182.
— — on linseed in India, 427.
— *lycopersici* on tomato, breeding against, 356; control, 610, 753; notes on, 355, 610; occurrence in British Guiana, 26; in New S. Wales, 758; in Trinidad, 609; in U.S.A., 27, 355, 356; varietal resistance to, 356.
— *martii*, action of ultra-violet rays on, 737.
— — var. *minus* on peas in Japan, 17.
— — — — on potato in Peru, 226.
— — var. *phaseoli* on bean, factors affecting, 556; occurrence in England, 143, 759; in U.S.A., 556; varietal resistance to, 143, 759.
— — — — on groundnut in U.S.A., 621.
— — var. *pisi* on peas in England, 144.
— *merismoides* var. *majus* on lucerne in Czecho-Slovakia, 624; *F. betae* and *Pionnotes rhizophila* synonyms of, 624.
— *moniliforme*, see *Gibberella moniliformis*.
— — var. *majus*, conidial stage of *Gibberella fujikuroi*, 332.
— — var. *subglutinans* in relation to pokkah boeng of sugar-cane in Hawaii, 4.
— *niveum*, H-ion relations of, 28.
— — on melon in Hungary, 620.
— — on watermelon, breeding against, 558; factors affecting, 557; occurrence in U.S.A., 422, 557, 558; strains of, 422, 557; studies on, 557, 558; varietal resistance to, 422, 558.
— *orthoceras* on cotton in Egypt, 513.
— (?) — on *Narcissus* in Denmark, 460.
— — var. *pisi* on peas, effect of, on transpiration, 85; factors affecting, 555; occurrence in U.S.A., 85, 86, 430, 555; studies on, 85, 86; transmission of, by seed, 555; varietal resistance to, 86, 430.
— *oxysporum* on sweet potato in U.S.A., 535.
— —, serological studies on, 798.
— —, *F. cubense* regarded as a form of, 281.
— — *aurantiacum*, physiological specialization in, 306.
— — *cubense* on banana, breeding against, 25, 383, 625; control, 25, 80, 585, 625; infection of the rhizome by, 312; legislation against, in Jamaica, 80; notes on, 61, 624; occurrence in British Guiana, 26; in the Canary Isles, 281; in Jamaica, 25, 61, 80, 585, 624; in Martinique, 463; (?) in Mauritius, 496; in Mexico, 463; in Trinidad, 383; varietal resistance to, 25, 383, 463.

[*Fusarium oxysporum cubense*] on plantain in India, 224.
— — *gladioli* on gladiolus in U.S.A., 356.
— — *medicaginis*, temperature relations of, 17.
— *poae*, action of luminous rays on, 737.
— (?) *putrefaciens* on apple in the Caucasus, 53.
— *pyrochroum* on aster (China) in Czecho-Slovakia, 624.
— *redolens* on peas in Czecho-Slovakia, 624.
— *sambucinum* on walnut in Germany, 339.
— *sarcochroum* on cacao in the Dominican Republic, 30.
— *scirpi* vars. *nigrans* and *pallens* on barley, oats, and wheat in Great Britain, 504.
— *solani* can infect citron, 39; orange, 40.
— — on citrus in Egypt, 39.
— — on cotton in Egypt, 513.
— — on potato in Peru, 226; in Rhodesia, 67.
— — on spinach in U.S.A., 28.
— (?) — var. *minus* on potato in Cyprus, 695.
— — — — on wheat in Russia, 709.
— *sporotrichioides* on peas in Japan, 17.
— *tracheiphilum* on cowpea in U.S.A., 220.
— (?) — on lupin in Czecho-Slovakia, 624.
— — on soy-bean in Siberia, 88.
— *trifolii* on clover in Czecho-Slovakia, 624.
— *vasinfectum*, H-ion relations of, 28.
— — on bean in Czecho-Slovakia, 624.
— — on cotton, breeding against, 453; control, 160, 638; factors affecting, 160, 638, 699, 781; histological effects of, 781; nature of resistance to, 781; occurrence in India, 453, 781; in Peru, 225; in Russian Central Asia, 316; in U.S.A., 160, 453, 638, (?) 699, 713; studies on, 453, 713, 781; varietal resistance to, 225, 453, 638, 781.
— (?) — on *Crotalaria juncea* in Trinidad, 107.
— — on *Hibiscus cannabinus* and *H. esculentus* in Russian Central Asia, 183.
— — on pigeon pea in India, 424, 426.
— — var. *aegyptiacum* on cotton in Egypt, 178.
— — var. *inodoratum* on cotton in Egypt, 513; (?) in Russia, 41.
— (?) *zonatum* on onion in U.S.A., 421.
— — var. on cacao in the Dominican Republic, 30.
Fusicladium diospyrae synonym of *F. levieri*, 795.
— *levieri* on persimmon in Japan, 794.
— *radiosum* conidial stage of *Venturia tremulae*, 136.
— *saliciperdum* on *Salix* in England, 139.
— — on *Salix alba* var. *vitellina* in U.S.A., 161.
— —, see also *Venturia chlorospora*.
Fusisporium rubi on blackberry and dewberry in U.S.A., 727.
Fusoma persicae on peach in Poland, 695.

G 1, composition of, and use of, against *Diplodia zeae*, *Gibberella saubinetii*, and *Nigrospora* on maize, 296.
Galanthus nivalis, see Snowdrop.
Galeola hydra, symbiont of, 317.
Galerucella luteola in relation to die-back of elms in France, 409.
Ganoderma applanatum, *Fomes vegetus* regarded as a form of, 11.
— — on *Abies sachalinensis*, *Acer pictum*, *Ligustrum ovalifolium*, and oak in Japan, 11.
— — on oil palm in Malaya, 105.
— — on persimmon and *Prunus mume* in Japan, 11.
— — on timber in Malaya, 105.
— —, systematic study on, 11.
— — var. *brownii*, *Elfvingia brownii* renamed, 11.
— — vars. *laevisporum*, *philippinense*, and *tornatum*, taxonomy of, 11.
— *lobatum*, systematic study on, 11.
— *lucidum* on oil palm in Malaya, 105.
— *oregonense* on *Pseudotsuga taxifolia*, spruce, and *Tsuga heterophylla* in Alaska, Canada, and U.S.A., 615.
— *pseudoferreum* on *Arenga saccharifera* and forest trees in Malaya, 402.
— — on *Hevea* rubber, control, 2, 72, 324; (?) a variety of *G. applanatum*, 402; notes on, 2, 72; occurrence in the Belgian Congo, 2; in Java, 72; in Malaya, 2, 324, 402, 744; studies on, 324, 402; wet root rot of Malaya due to, 402.
— — on *Myristica* and *Pterocarpus* in Malaya, 402.
— — on tea in Java, 131.
Garcinia mangostana, see Mangosteen.
Garlic (*Allium sativum*), *Puccinia porri* on, in Kenya, 159.
Gas storage of fruit, 247, 659.
Gelatine, use of, as a spreader, 464, 732.
Geotrichum a genus of the Torulopsidaceae, 477, 642.
Gerbera, *Bacterium solanacearum* on, in Sumatra, 477.
Germator seed disinfection apparatus, 117, 502.
Germisan, effect of, on grass seed, 722; on wheat grain, 169.
—, factors affecting germination of seed-grain treated with, 773.
—, persistence of, on treated seed-grain, 361, 706.
—, toxicity of, to *Armillaria mellea*, 681.
—, use of, against barley and beet diseases, 117; against *Calonectria graminicola* on rye, 777; against *Cercospora beticola* on beet, 348; against *Cladosporium cucumerinum* on cucumber, 691; against *Fusarium* on *Narcissus*, 376; on wheat, 568; against *Helminthosporium gramineum* on barley, 568, 766; against *Pleospora graminea* on barley, 162; against seed-borne

diseases, 64 ; against *Urocystis occulta* on rye, 162 ; against *Ustilago avenae* on oats, 568 ; against wheat bunt, 162.
[Germisan], short disinfection process, use of, against flax diseases, 784 ; against wheat bunt, 502.
Giant hill of potato in U.S.A., 667.
Gibberella on hops in England, 127.
— on soy-bean in Siberia, 88.
— *baccata* var. *evonymi*, see *Fusarium lateritium* var. *fructigenum*.
— — var. *moricola* on mulberry in Holland, 95 ; in Italy, 281.
— *fujikuroi* can infect maize, 332.
— —, *Fusarium moniliforme* var. *majus* conidial stage of, 332.
— —, *Lisea fujikuroi* synonym of, 332.
— —, method of testing viability of conidia of, 400.
— — on rice, bakanae disease attributed to, 332 ; control, 399 ; effect of culture filtrate of, on growth, 399, 400, 536, 537 ; *Lisea fujikuroi* renamed, 399 ; may be identical with *G. moniliformis*, 399 ; occurrence in Japan, 332, 399, 400, 536, 537 ; studies on, 332, 399, 536, 537 ; varietal susceptibility to, 399 ; wrongly identified as *Fusarium heterosporum*, 399.
— — on sugar-cane in Japan, 332.
— *moniliformis*, *G. fujikuroi* may be identical with, 399.
— — on banana in Uganda, 353.
— — on cotton in U.S.A., 430, 453.
— — on maize, control, 570 ; factors affecting, 569 ; mixed inoculations with, 29 ; occurrence in the Argentine, 505 ; in New S. Wales, 222 ; in U.S.A., 569 ; study on, 569 ; variability of, 570 ; varietal susceptibility to, 505.
— — on sugar-cane in Cuba, 327 ; in Hawaii, 674 ; (?) in India, 425 ; (?) in Indo-China, 432 ; in the Philippines, 203 ; varietal susceptibility to, 327. (See also Pokkah boeng of.)
— *moricola*, see *G. baccata* var. *moricola*.
— *saubinetii*, action of, on cellulose, 800.
— —, enzymes of, 102.
— — on barley, 293.
— — on *Equisetum* in Germany, 581.
— — on hops in France, 23.
— — on maize, control, 39, 297 ; cytology of, 234 ; effect of sugary gene on resistance to, 778 ; factors affecting, 234, 447, 778 ; mixed inoculations with, 29 ; notes on, 163, 234, 431 ; occurrence in the Argentine, 505 ; in Guatemala, 431 ; in Kenya, 39, 163 ; in New S. Wales, 222 ; in Rhodesia, 39 ; in Uganda, 353 ; in U.S.A., 170, 297, 447, 778 ; studies on, 170, 234.
— — on rice in Japan, 537.
— — on wheat in the Argentine, 505.
— —, temperature relations of, 17.
Gibellula alata on spiders in Ceylon, 574.
— *aranearum* on spiders in Ceylon, 574 ; in England, 299 ; in Europe and the West Indies, 573 ; synonymy of, 574 ; wrongly identified as *Isaria arachnophila*, 299.
[*Gibellula*] *elegans* synonym of *G. aranearum*, 574.
'Gilah' disease of tobacco in Sumatra, 478. (See also Leaf curl of.)
Ginger (*Zingiber officinale*), *Coniothyrium zingiberi*, *Nectriella zingiberi* and its var. *pallida*, and *Rosellinia zingiberi* on, in the Philippines, 74.
Ginkgo biloba, *Pestalozzia sinensis* on, in China, 746.
Gladiolus, *Bacterium marginatum* on, control, 356, 428 ; occurrence (?) in Australia and Canada, 544 ; in Denmark, 768 ; (?) in Germany, Great Britain, Holland, and New Zealand, 544 ; in U.S.A., 356, 428.
—, *Botrytis* on, in Canada, 244.
—, diseases of, in U.S.A., 649.
—, *Fusarium oxysporum* var. *gladioli* on, in U.S.A., 356.
—, *Sclerotinia gladioli* on, in N. America, 665 ; ascigerous stage of *Sclerotium gladioli*, 666.
—, *Septoria gladioli* on, in Switzerland, 24 ; in U.S.A., 356.
—, virus disease of, in England, 591.
Glenospora lanuginosa, *Blastomycoides lanuginosus* renamed, 106.
Glenosporella, a new genus of Hyphales, 106.
— *albiscicans* and *G. dermatitidis*, diagnoses of, 106.
Gliocladium in a butter churn in U.S.A., 181.
Gliricidia, *Nectria* on, with *Fusarium* stage, in Costa Rica, 369.
—, resistance of, to *Rosellinia bunodes* and *R. pepo*, 26.
Gloeodes pomigena on apple (?) a stage of *Leptothyrium pomi*, 657 ; control, 560 ; notes on, 21 ; occurrence (?) in England, 21 ; in Germany, 657 ; in U.S.A., 560 ; synonyms of, 657.
— — on citrus in U.S.A., 365.
— — on orange in S. Africa, 105.
Gloeosporium on coffee in Costa Rica, 369.
— on *Hevea* rubber in Indo-China, 433.
— on lemon in Sierra Leone, 97.
— on tomato in Trinidad, 610.
— *albo-rubrum* on *Hevea* rubber in Indo-China, 432.
— *album* on quince in England and Wales, 423.
— *allescheri* on *Kentia* in Holland, 96.
— *ampelophagum* on vine, control, 352 ; note on, 622 ; occurrence in Australia, 352 ; in France, 351 ; in India, 622 ; sap concentration in relation to, 351.
— *amygdalinum* on almond in S. Africa, 115, 249.
— *caryae* var. *curvisporum* on pecan in U.S.A., 213.
— *coffeicola* on coffee in Tanganyika, 712 ; *Colletotrichum coffeanum* considered identical with, 712.
— *cyclaminis* on cyclamen in Germany, 650.

[*Gloeosporium*] *digitalis* renamed *Colletotrichum digitalis*, 328.
— *hesperidearum* on orange in Uruguay, 226.
— *limetticolum* on lime, breeding against, 284; control, 698; factors affecting, 698; occurrence in British Guiana, 26; in Dominica, 284; in St. Lucia, 698; in Trinidad, 283; varietal resistance to, 284.
— *mangiferae* on mango in Guatemala, 431; in S. Africa, 793; (?) identical with *Colletotrichum gloeosporioides*, 793.
— (?) *manihotis* on cassava in Sierra Leone, 97.
— *musarum* on banana, control, 383; occurrence in Brazil, 728; in Ceylon, 382; in England (on S. American fruit), 189; in India, 382; in Italian Somaliland, 765; in Martinique, 463; in Trinidad, 382, 383; studies on, 189, 382, 383.
— *olivarum* on olive in Uruguay, 226.
— *papayae* on papaw in Ceylon, 223.
— *perennans* on apple, control, 51, 249; *Eriosoma lanigerum* in relation to, 248; factors affecting, 788; occurrence in Canada, 248; in U.S.A., 51, 656, 788; studies on, 248, 788.
— *piperatum* imperfect stage of *Glomerella cingulata*, 803.
— *pirinum* synonym of *Elsinoe piri*, 724.
— *ribis* var. *macrosporum* on gooseberry in Rumania, 312.
— *sansevieriae* on *Sansevieria zeylanica* in S. Africa, 268.
Glomerella cingulata ascigerous stage of *Colletotrichum cajani*, 425; of *C. nigrum* and *Gloeosporium piperatum*, 803.
(?) — — can infect apple, chilli, fig, grapefruit, orange, persimmon, tomato, and vine, 313.
— — on apple, notes on, 313; occurrence in U.S.A., 654.
— — on banana in Trinidad, 382.
— — on chilli in U.S.A., 803.
— — on coffee, control, 159; factors affecting, 159; occurrence in India, 368; in Indo-China, 432; in Kenya, 159; in Malaya, 769.
(?) — — on *Zizyphus jujuba* in U.S.A., 313.
— — var. *vaccinii* on cranberry in U.S.A., 188.
— *gossypii* on cotton in Rhodesia, 638.
— *lycopersici* on tobacco in Sumatra, 478.
Gloxinia, *Cylindrocarpon radicicola* on, in Holland, 767.
Glue, use of, as a spreader, 350, 587.
Glyceride oils, use of, as fungicides, 464.
Glycine, see Soy-bean.
Gnomonia on pecan in U.S.A., 213.
— *leptostyla* on walnut in England, 79; *Marssonina juglandis* conidial stage of, 79.
Godronia cassandrae on cranberry in U.S.A., 188.
'Gold' disease of strawberry in U.S.A., 496.
Gonatorrhodiella coccorum on *Aleyrodes*, aphids, leafhoppers, and *Lecanium*, 179.
[*Gonatorrhodiella coccorum*], *Rhinotrichum album* synonym of, 179.
Gooseberry (*Ribes grossularia*) eradication, see *Ribes* eradication.
—, *Gloeosporium ribis* var. *macrosporum* on, in Rumania, 312.
—, *Puccinia ribesii-caricis* on, in Esthonia, 24.
—, *Sphaerotheca mors-uvae* on, in Germany, 799; in Ireland, 380.
Gossypium, see Cotton.
Gramineae, see Grasses.
Grapefruit (*Citrus decumana*), *Clitocybe tabescens* on, in U.S.A., 365.
—, *Diplodia natalensis* on, in U.S.A., 771.
—, (?) *Glomerella cingulata* can infect, 313.
—, 'greasy spot' of, in St. Lucia, 698.
—, gummosis of, in U.S.A., 770.
—, *Leptosphaeria citricola* on, (?) in Cuba, 544.
—, *Phomopsis citri* on, in U.S.A., 771.
—, *Phytophthora citrophthora* on, in S. Africa, 331; in U.S.A., 779.
—, pitting of, in U.S.A., 570.
—, psorosis of, control, 770; etiology of, 365; occurrence in U.S.A., 365, 366, 770.
—, scald of, in U.S.A., 570.
—, *Sporotrichum citri* on, in Sierra Leone, 97.
—, withertip of, in Jamaica, 26.
Graphiola phoenicis on date palm in U.S.A., 572.
Graphium ulmi, see *Ceratostomella ulmi*.
Grasses, *Epichloe typhina* on, in Esthonia, 25.
—, *Sclerotium rhizodes* on, in England, 654.
—, see also Turf.
'Greasy spot' of grapefruit in St. Lucia, 698.
'Grey disease' of *Narcissus*, see Mosaic.
— speck, see Manganese deficiency disease.
Gross-Tillator seed-dusting apparatus, 36.
Groundnut (*Arachis hypogaea*), *Bacterium solanacearum* on, in S. Africa, 123; in U.S.A., 621.
—, *Cercospora personata* on, control, 279; losses caused by, 279; occurrence in the Cameroons and French W. Africa, 279; in the Gambia, 27; in Guatemala, 430; in Italian Somaliland, 20; in U.S.A., 430; study on, 20; synonyms of, 20; varietal susceptibility to, 430.
— chlorosis in the Gambia, 697.
—, clump disease of, in India, 223; in Senegal, 93.
—, *Diplodia natalensis* and *Fusarium martii* var. *phaseoli* on, in U.S.A., 621.
—, *Macrophomina phaseoli* on, in the Gambia, 27.
—, *Olpidium trifolii* and *O. viciae* can infect, 720.
—, *Pythium ultimum* on, in S. Africa, 331.
— rosette, *Aphis laburni* as vector of, 697; control, 93, 697; factors affect-

ing, 27; 'gana' and 'leprosy' synonyms of, 92; host range of, 697; occurrence in the Gambia, 27, 697; in Madagascar, 699; in Senegal, 92; study on, 697; varietal resistance to, 27, 93, 697.
[Groundnut], *Sclerotium rolfsii* on, control, 621; occurrence in Guatemala, 431; in Madagascar, 699; in U.S.A., 621; varietal resistance to, 621.
Guava (*Psidium guajava*), *Phyllosticta psidii* on, in S. Africa, 268.
Guignardia bidwellii on vine, legislation against, in Austria, 416; in Spain, 752; occurrence in Austria, 416; in France, 351; in India, 222; sap concentration in relation to resistance to, 351.
— *vaccinii* on cranberry in U.S.A., 188, 429.
Guinea-pig, *Trichophyton lacticolor* on the, in the Argentine, 784.
Gum spot of citrus leaves in Cyprus, 571.
Gummosis of citrus in Jamaica, 26, 625; in U.S.A., 365.
— of fruit trees in Italy, 660.
— of grapefruit and orange in U.S.A., 770.
Gymnoascaceae, Dermatomycetes regarded as belonging to the, 575.
Gymnosporangium botryapites on *Chamaecyparis thyoides* in U.S.A., 140.
— *confusum* on *Juniperus phoenicea*, *J. sabina*, and quince in Europe, 145.
— (?) *corniculans* on *Amelanchier alnifolia*, heterothallism in, 262.
— *germinale* on *Juniperus communis*, *J. sibirica*, *J. virginiana*, and quince in U.S.A., 412.
— *globosum* on *Crataegus*, *Juniperus barbadensis*, and *J. virginiana* in U.S.A., 412.
— *juniperi-virginianae* on apple, legislation against, in Spain, 752; occurrence in U.S.A., 412.
— — on *Juniperus barbadensis*, *J. sabina*, and *J. scopulorum* in U.S.A., 412.
— — on *Juniperus virginiana*, legislation against, in Spain, 752; occurrence in U.S.A., 412.
— *myricatum* on *Chamaecyparis thyoides* and *Crataegus* in U.S.A., 140.
— *sabinae*, phenology of, in Austria, 799.
Gynura, *Bacterium solanacearum* on, in Sumatra, 477.

Hadrotrichum agrostidis and *H. microsporum* var. *macrosporum* synonyms of *H. virescens*, 722.
— *piri* and *pirinum* synonyms of *Elsinoe piri*, 724.
— *populi* renamed *Sphaceloma populi*, 724.
— — var. *piri* synonym of *Elsinoe piri*, 724.
— *virescens* conidial stage of *Scirrhia agrostidis*, 722.
— —, synonymy of, 722.
Hainesia lythri a stage of *Pezizella lythri*, 252.
Halobyssus moniliformis var. *parasiticus* on man in Italy, 578.
Haplocerambyx spinicornis, *Beauveria bassiana* on, 179.
Haplosporella on lemon in Tanganyika, 697.
Haplotrichum violaceum in soil in France, 325.
Havrefusariol, composition of, and use of, against *Ustilago avenae* on oats, 163.
Havretillantin, use of, against *Fusarium* on wheat and *Ustilago avenae* on oats, 568.
Hazel nut, see *Corylus*.
'Healthy potato' virus, see Potato, 'healthy potato' virus of.
Heart necrosis of potato in Germany, 534.
— rot of banana, legislation against, in New S. Wales, 416; occurrence in Queensland, 157.
— — of beet in Germany, 559; in Holland, 147; in Switzerland, 495; relation of boron deficiency to, 147. (See also *Phoma betae* on, and Dry rot of.)
— — of celery in Canada, 279.
Hedgehog, *Mycotorula albicans* and *Mycotoruloides* on the, in France, 457.
Hedit, use of, against *Ganoderma pseudoferreum* on tea, 131.
Helianthus annuus, see Sunflower.
— *tuberosus*, *Sclerotinia sclerotiorum* can infect, 652.
— —, *Sclerotium rolfsii* on, in the Gold Coast, 696.
Helicobasidium purpureum on rhubarb in Germany, 691.
— — on *Salix* in Czecho-Slovakia, 157.
Héliones, see Dyes, aniline.
Heliothrips fasciatus, transmission of fig diseases by, in U.S.A., 522.
Helminthosporium, action of, on cellulose, 800.
— in relation to diamond spot of cotton fabrics, 241.
— on *Agrostis stolonifera* in U.S.A., 161.
— on barley in Canada, 293, 294.
— on date palm in U.S.A., 572.
— on locusts in Russia, 42.
(?) — on *Musa textilis* in the Philippines, 301.
— on orange in the Caucasus, 636.
— on rice in U.S.A., 159.
— on turf in U.S.A., 161.
— on wheat in Canada, 294; in India, 632.
—, saltation in, 393.
— *avenae* on oats in Great Britain, 294, 295.
— *cacaophilum* on cacao in the Dominican Republic, 30.
— *curvulum* on chilli in U.S.A., 803.
— *gibberosporum*, action of luminous and ultra-violet rays on, 737.
— — on banana in Italian Somaliland, 384.
— *gramineum* on barley, control, 506, 560, 568, 707, 766, 775; losses caused by, 560; occurrence in Canada, 445; in Germany, 37, 445, 559, 707, 775; in Holland, 766; in New Zealand,

506; in Sweden, 568; in U.S.A., 445, 560; physiologic specialization in, 445; varietal resistance to, 560.
[*Helminthosporium*] *heveae* on *Hevea* rubber in Indo-China, 433; in Malaya, 2.
— *leucostylum* on *Eleusine aegyptiaca* in India, 426.
— — — — *coracana* in India, 426; in Uganda, 353.
— *nodulosum* can infect barley, maize, oats, *Panicum frumentaceum*, *P. miliaceum*, *Pennisetum typhoideum*, sorghum, sugar-cane, and wheat, 426.
— — on *Eleusine aegyptiaca* and *E. coracana* in India, 426.
— *ocellum* on sugar-cane, factors affecting, 4; occurrence in Cuba, 327; in Hawaii, 4, 674; in Mauritius, 127; varietal resistance to, 4, 327.
— *oryzae* on barley in Russian Central Asia, 315.
— — on rice in Indo-China, 433; in Peru, 225; in Russian Central Asia, 315.
— —, see also *Ophiobolus miyabeanus*.
— *papayae* on papaw in the Philippines, 662.
— *sacchari* on sugar-cane in the Philippines, 203.
— *sativum* can infect oats, 632.
— — in soil in Canada, 169.
— — on barley, control, 632; occurrence in England, 632; in Kenya, 159; in Peru, 225.
— — on oats in New S. Wales, 503.
— — on wheat, control, 292, 504, 567, 632; factors affecting, 291, 292, 530; histological effects of, 293; immunization against, 529; mixed inoculations with, 708; notes on, 291; occurrence in Canada, 169, 291, 292, 293; in England, 632; in India, 426, 633; in New S. Wales, 503; in Peru, 225; in S. Africa, 529; in Western Australia, 567; studies on, 169, 292, 503, 529, 632; varietal susceptibility to, 225, 426, 503, 633.
— *sigmoideum* conidial stage of *Sclerotium oryzae* on rice, 469.
— *stenospilum* on sugar-cane, factors affecting, 4, 540; occurrence in Cuba, 327; in Hawaii, 4, 540; *Ophiobolus* ascigerous stage of, 4; varietal susceptibility to, 327.
— *teres* on barley in Germany, 37; in India, 426.
— *torulosum* on banana in Italian Somaliland, 765; in Jamaica, 25; in Trinidad, 464; study on, 464; varietal susceptibility to, 464.
— *tritici-repentis* on *Agropyron repens* and rye in Poland, 695.
— — on wheat in India, 426.
— *turcicum* on maize in Kenya, 163.
Hemicelluloses, decomposition of, by soil micro-organisms, 263.
Hemileia vastatrix on coffee, control, 368, 572; notes on, 572; occurrence in India, 368, 511, 636; in Malaya, 769; in Rhodesia, 572; physiologic forms of, 511, 636; seasonal periodicity of, 368; varietal resistance to, 511, 636.
Hemp (*Cannabis sativa*), *Phyllosticta cannabis* on, in Bulgaria, 745.
—, *Sclerotinia sclerotiorum* on, in Russia, 652.
—, *Sclerotium rolfsii* on, in India, 158.
Hendersonia crastophila on *Andropogon halepensis* in Spain, 675.
Hereditary sprain of potato in Italy, 199.
Herpetomonas ganorae in *Ficus hochstetteri* in Eritrea, 613.
Hertzian waves, effect of, on fungus cultures, 593.
Heterobasidium imperfect stage of *Fomes annosus*, may be mistaken for *Oedocephalum*, 82.
Heterodera radicicola on *Musa textilis* in the Philippines, 46.
— *schachtii* in relation to potato sickness of soil in Great Britain, 144, 202, 323.
Heterosporium on barley in Canada, 293.
— *allii* var. *cepivorum* on onion in England, 423.
— *secalis* on rye in S. Africa, 267.
Hevea brasiliensis, see Rubber.
Hiba wood (*Thujopsis dolabrata*), *Fomes robustus* on, in Japan, 812.
— — oil, toxicity of, to wood destroying fungi, 816.
Hibiscus cannabinus, *Fusarium vasinfectum* on, in Russian Central Asia, 183.
— —, leaf curl of cotton can infect, 239.
— —, *Moniliopsis aderholdi* and *Oidiopsis taurica* on, in Russian Central Asia, 183.
— —, *Sclerotium rolfsii* on, in India, 158.
— *esculentus*, *Cercospora malayensis* on, in the Philippines, 130.
— —, *Fusarium vasinfectum* on, in Russian Central Asia, 183.
— —, leaf curl of cotton can infect, 239.
— —, *Moniliopsis aderholdi* and *Oidium abelmoschii* on, in Russian Central Asia, 183.
— —, *Phymatotrichum omnivorum* can infect, 640.
— *sabdariffa*, leaf curl of cotton can infect, 239.
— —, *Phytophthora* on, in India, 158, 426.
— —, *Rhodochytrium spilanthidis* on, in Sumatra, 301.
Hippeastrum equestre, mosaic of, 406.
Hirsutella abietina on *Pyrilla pusana*, 179; *Isaria abietina* renamed, 179.
— *eleutheratorum* on beetles in Great Britain, 573; *Isaria eleutheratorum* renamed, 573.
— *saussurei*, *Beauveria peteloti* stated to be a *Sporotrichum* growing on, 179.
— *subulata* on caterpillars in Great Britain, 573; *Isaria floccosa* renamed, 573.
Hohenheimer Beize, see Urania.
Holcus lanatus, *Claviceps purpurea* and *Tilletia holci* in seed samples of, in Denmark, 304.
Holder spraying apparatus, 167, 205; use of, in field inoculations with rusts, 167.

Hollow heart of potato in Germany, 535.
Hollyhock (*Althaea*), diseases of, in U.S.A., 649.
—, leaf curl of, in the Sudan, 239.
—, *Phytophthora megasperma* on, in U.S.A., 303.
—, *Plenodomus meliloti* on, in Canada, 303.
Holodiscus discolor, witches' broom of, in U.S.A., 110.
Hopea acuminata and *H. philippinensis*, *Fomes pachyphloeus* on, in the Philippines, 613.
Hops (*Humulus lupulus*), chlorotic disease of, in England, 423, 539, 745; study on, 539.
—, *Fusarium* on, in England, 127.
—, *Gibberella* on, in England, 127.
—, — *saubinetii* on, in France, 23.
—, infectious sterility of, in Czecho-Slovakia, 624.
—, 'kadeřavost' of, in Czecho-Slovakia, 624.
— mosaic, disappearance of, from Czecho-Slovakia, 624; notes on, 424, 539; occurrence in England, 424, 745.
—, nettlehead of, 539; occurrence in England, 744.
—, *Pseudoperonospora humuli* on, control, 464, 471, 602; legislation against, in the British Isles, 543; method of obtaining oospores of, 402; notes on, 471; occurrence in Canada, 402, 602; in Czecho-Slovakia, 472; in England, 94, 464, 471, 602, 744; varietal resistance to, 94, 471, 472.
—, *Sphaerotheca humuli* on, control, 253, 464; occurrence in England, 464.
—, split leaf of, in England, 744.
Hordeum, *Septoria passerini* on, in Bulgaria, 745.
— *jubatum*, *Bacterium translucens* var. *undulosum* can infect, 434.
— —, *Puccinia glumarum* on, in the Argentine, 499.
— *murinum*, *Puccinia graminis* on, in S. Africa, 164, 231.
—, *vulgare*, see Barley.
Hormiscium antiquum on timber in Russia, 616.
Hormodendrum in butter churns in U.S.A., 181.
— *cladosporioides* in soil in France, 375.
— (?) *fontoynonti* or (?) *olivaceum* on man in Porto Rico, 646.
(?) — *pallidum* on cacao in the Dominican Republic, 30.
Hormonema dematioides on timber in Russia, 616.
Horse, *Acrostalagmus cinnabarinus* on the, in Africa, 577; in Cyrenaica, 458.
—, *Trichophyton mentagrophytes* on the, in England, 45.
—, see also Equines.
Horse-radish (*Cochlearia armoracia*), *Cystopus candidus* on, in Germany, 688.
Horst's dust, use of, against *Plasmopora viticola* on vine, 692.
Hot air treatment of onions against *Peronospora schleideni*, 690; of timber against *Merulius lacrymans*, 83; of tomato seed, *dosis tolerata* for, 483.
[Hot] water seed treatment against *Bacterium medicaginis* var. *phaseolicola* on bean, 687; against *Bact. vesicatorium* on tomatoes, 355; against *Cercospora betae* on beet, 356; against chlorotic streak disease of sugar-cane, 674; against *Phoma betae* on beet and *Phomopsis vexans* on eggplant, 356; against tomato diseases, *dosis tolerata* for, 483; against *Ustilago hordei* on barley, 505, 776; against *U. nuda* on barley, 505, 567, 633; against *U. tritici* on wheat, 289, 443; against vegetable diseases, 279.
— — treatment against *Narcissus* diseases, 786; for sugar-cane setts, 540.
Howea forsteriana, *Pestalozzia palmarum* on, in U.S.A., 377.
Humicola, decomposition of hemicelluloses by, 263.
Humulus lupulus, see Hops.
Hyacinth (*Hyacinthus*), *Fusarium culmorum* on, in Denmark, 460.
— mosaic in Czecho-Slovakia, 624.
—, *Penicillium corymbiferum* and (?) other spp. and *Pseudomonas hyacinthi* on, in Denmark, 460.
Hyalopsora aculeata can infect *Abies mayriana*, 813.
— — on *Blechnum amabile* and *B. spicant* var. *nipponicum* in Japan, 813.
Hyalopus onychophilus on man in Italy, 576; *Allantospora onychophila* renamed, 576.
Hydnum on cotton in U.S.A., not a stage of *Phymatotrichum omnivorum*, 27.
— *murashkinskyi* on birch in Eastern Asia and Siberia, 268.
— *ochraceum* on oak in U.S.A., 497.
— *reflexum* on birch in Eastern Asia and Siberia, 268.
Hydrochloric acid as a constituent of mycothanaton, 217.
— —, use of, with mercuric chloride, against *Bacillus amylovorus* on apple and pear, 185; against *Corticium solani* on potato, 260.
Hydrogen-ion concentration in relation to *Actinomyces scabies*, 122, 626; to *Bacillus amylovorus*, 306; to *B. phytophthorus*, 122, 226; to *Bacterium rubefaciens*, 122; to *Bact. tabacum*, 480; to *Bact. tumefaciens*, 226; to *Cercospora* on pigeon pea, 425; to copper deficiency disease of fruit trees, 724; to *Didymella lycopersici*, 810; to *Epidermophyton floccosum*, 575; to *Fusarium angustum*, 513; to *F. conglutinans* and *F. discolor*, 28; to *F. martii phaseoli*, 556; to *F. niveum*, 28, 557; to *F. orthoceras*, 513; to *F. vasinfectum*, 28; to *F. v.* var. *inodoratum*, 513; to *Gloeosporium perennans*, 788; to grey speck of oats, 363; to *Metarrhizium anisopliae*, 782; to *Microsporon audouini*, 575; to mushrooms (cultivated), 493; to *Mycoderma nobile*, 300; to *Neofabraea malicorticis*, 788; to *Nigrospora* on maize,

448 ; to *N. oryzae*, 711 ; to *Phytomonas berberidis*, 109 ; to *P. viburni*, 110 ; to *Phytophthora cactorum* and its var. *applanata*, 580 ; to *P. infestans*, 122 ; to *P. syringae*, 580 ; to *Plasmodiophora brassicae*, 623 ; to potato crinkle, leaf roll, and mosaic, 122 ; to potato sprain (internal rust spot), 670 ; to *Pythium* on sugar-cane, 5 ; to soil fungi, 803 ; to *Spongospora subterranea*, 122 ; to *Synchytrium endobioticum*, 122 ; to the action of food preservatives, 466 ; of abavit B, ceresan, and tutan, 707 ; of sulphur, 195, 730 ; to the characterization of fungus species, 736 ; to *Thielavia basicola*, 496 ; to tobacco frenching, 7 ; to *Trichophyton gypseum*, *T. rosaceum*, and *T. violaceum*, 575 ; to *Verticillium albo-atrum*, 626 ; to wound cork formation of potato, 201.

[Hydrogen-ion concentration] of ejections of *Eutettix tenella*, 619.

— peroxide, *dosis tolerata* of, for tomato seed, 483.

— —, use of, against *Pseudomonas citri* on citrus, 752.

— sulphide, see Sulphuretted hydrogen.

Hydrophilic colloidal sulphur, see Colloidal sulphur, hydrophilic.

Hydroquinone, toxicity of, to *Armillaria mellea*, 681.

Hymenomycetes as symbionts of orchids, 317.

—, Myxomycetes on, parasitism of, 594.

Hymenostilbe arachnophila on spiders in England, 299 ; *Isaria arachnophila* renamed, 299.

— *muscarium* on flies in England, 241.

Hyoscyamus, *Peronospora hyoscyami* on, in Rumania, 156.

—, virus diseases of, in England, 735.

— *niger*, *Didymella lycopersici* can infect, 809.

— —, tomato aucuba mosaic on, intracellular bodies in, 335.

— —, — spotted wilt can infect, 549.

Hyphomycetes, modified classification of, 106.

Hypnocapnodium mikanum on orange in Japan, 329 ; *Meliola citri* (p.p.) synonym of, 329.

— *quercifolium* on oak in Japan, 330.

Hypochnus catonii as a symbiont of *Cymbidium*, 317.

Hypocrella philippinensis on an Aleyrodid in the Philippines, 455 ; *Aschersonia philippinensis* conidial stage of, 455.

— *schizostachyi* on *Lecanium bambusicola*, 179.

Hypodermella sulcigena on pine in Finland, 486.

Hypoxylon regium synonym of *Nummularia regia*, 611.

Hysterangium boudieri on *Iris unguicularis* and *Narcissus* in France, 23.

Ialine, analytical studies on, 194, 587.

—, toxicity of, to *Sclerotinia americana*, 385.

Ilex opaca, *Pestalozzia stellata* on, in U.S.A., 377.

Immunity in plants, review of work on, 391.

— — —, use of medical terminology for, deprecated, 315.

—, local, in plants, 391.

Immunization of beans against *Botrytis cinerea*, 593, 798 ; of wheat against *Helminthosporium sativum*, 529.

Indiella brumpti on man in Brazil, 242.

Infectious chlorosis, see Chlorosis, infectious.

— sterility of hops in Czecho-Slovakia, 624.

Infra-red rays, effect of, on fungus cultures, 593.

Inga, *Nectria* on, with *Fusarium* stage, in Costa Rica, 369.

—, *Omphalia flavida* on, in Guatemala, 431.

Insect vectors, specificity of the relationship between plant viruses and, 591.

Internal brown or rust spot of potato, see Sprain of.

Iodine, use of, against *Actinomyces dermatonomus* on sheep, 457.

Ipomoea batatas, see Sweet potato.

Ips calligraphus and *I. grandicollis* in relation to *Ceratostomella ips* on pine in U.S.A., 341.

Iris, *Armillaria mellea* on, in England, 376.

—, *Bacterium iridicola* on, in Japan, 108.

—, *Didymellina macrospora* on, in England, 559.

— diseases in U.S.A., 649.

—, *Hysterangium boudieri* on, in France, 23.

— mosaic, cytology of, 796 ; occurrence in Japan, 797 ; in U.S.A., 430.

—, *Sclerotium delphinii* on, in Holland, 96.

—, virus disease of, in England, 591.

Iron chlorosis, pecan rosette in U.S.A. probably a form of, 684.

— deficiency in relation to chlorosis of lupin in Germany, 721 ; to chlorosis of plants, 325 ; to chlorosis of trees in U.S.A., 499, 811 ; to Pahala blight of sugar-cane in Hawaii, 328.

— nails, use of, against chlorosis of apple, 811.

— sulphate, use of, against *Botrytis cinerea* on vine, 623 ; against *Gloeosporium ampelophagum* on vine, 352 ; as a wound disinfectant, 613. (See also Ferrous sulphate.)

— — -lime-sulphur mixture, use of, against *Venturia inaequalis* on apple, 252.

—, see also Ferric, Ferrous.

Isaria abietina renamed *Hirsutella abietina*, 179.

— *arachnophila*, *Gibellula aranearum* wrongly identified as, 299.

— — renamed *Hymenostilbe arachnophila*, 299.

— *aranearum* synonym of *Gibellula aranearum*, 574.

[*Isaria*] *cicadae* on locusts, 179.
— *eleutheratorum* renamed *Hirsutella eleutheratorum*, 573.
— *farinosa* on bees, pathogenicity of, 180.
— —, *Sporotrichum isariae* on, in England, 241.
— *floccosa* renamed *Hirsutella subulata*, 573.
—, see also *Spicaria*.
Isariopsis griseola on bean in Guatemala, 431.
— — on soy-bean in Siberia, 89.

Jerusalem artichoke, see *Helianthus tuberosus*.
Jeyes' fluid, use of, against *Fusarium oxysporum cubense* on banana, 25.
Juglans, see Walnut.
Juniperus, *Pestalozzia funerea* on, in U.S.A., 377.
—, (?) *Phomopsis juniperovora* on, in Holland, 96.
— *barbadensis*, *Gymnosporangium globosum* and *G. juniperi-virginianae* on, in U.S.A., 412.
— *communis*, *Gymnosporangium germinale* on, in U.S.A., 412.
— *phoenicea*, *Gymnosporangium confusum* on, in the Mediterranean region, 145; virulence of, to quince, 145.
— *sabina*, *Gymnosporangium confusum* on, in Central Europe, 145; virulence of, to quince, 145.
— —, — *juniperi-virginianae* on, in U.S.A., 412.
— *scopulorum*, *Gymnosporangium juniperi-virginianae* on, in U.S.A., 412.
— *sibirica*, *Gymnosporangium germinale* on, in U.S.A., 412.
— *virginiana*, *Gymnosporangium germinale* and *G. globosum* on, in U.S.A., 412.
— —, — *juniperi-virginianae* on, legislation against, in Spain, 752; occurrence in U.S.A., 412.
Jute (*Corchorus*), *Epicoccum neglectum* on, in Russian Central Asia, 183.

K-1-C and K-1-D, composition of, and use of, against *Ustilago avenae* and *U. kolleri* on oats, 634.
K-1-K, use of, against *Bacterium pruni* on peach, 355.
K-1-X, use of, against *Sclerotium rolfsii* on cotton, 298.
Kabatiella caulivora on clover in Denmark, 768; in U.S.A., 461.
'Kadeřavost' disease of hops in Czecho-Slovakia, 624.
Kale (*Brassica oleracea* var. *acephala*), *Fusarium conglutinans* on, in U.S.A., 490.
Kalmia latifolia, *Phomopsis kalmiae* and *Phyllosticta kalmifolia* on, in U.S.A., 649.
Kantsmut, composition of, and use of, against *Ustilago avenae* and *U. kolleri* on oats, 634.
Kaolith injury to peach in U.S.A., 520.
Katagel, composition of, and effect of storage on germination of wheat dusted with, 567.
Kayso, use of, as a spreader, 161.
Kelsey spot of plum in S. Africa, 521.
Kentia, *Gloeosporium allescheri* on, in Holland, 96.
Kerol, use of, against *Rhizoctonia* and *Sclerotium rolfsii* on *Piper betle*, 158.
'Kigabi' of cotton in Uganda, 353.
Kohlrabi (*Brassica oleracea* var. *caulorapa*), *Plasmodiophora brassicae* on, in Germany, 16, 490.
Kola (*Cola acuminata*), *Fomes lamaoensis* on, in Sierra Leone, 97.
Kolodust injury, 494.
—, size of particles of, 195.
—, toxicity of, to *Sclerotinia americana*, 385.
—, use of, against *Erysiphe polygoni* on beans and peas, 28; against *Puccinia graminis* and *P. triticina* on wheat, 286; against *Sphaerotheca pannosa* on roses and *Uromyces caryophyllinus* on carnation, 28; against *Venturia pirina* on pear, 494.
Kolofog, composition of, 788.
—, use of, against *Gloeodes pomigena* on apple, 560; against *Venturia inaequalis* on apple, 788.
'Korab' disease of tobacco, identical with 'pock' disease, 333; occurrence in Sumatra, 333, 478.
Kräuselkrankheit of cassava identical with mosaic, 152.
Kringerigheid of potato distinct from hereditary sprain, 199.
Kroepoek and krulziekte of tobacco, see Leaf curl of.
Kuehneola fici, see *Cerotelium fici*.
Kukaka, use of, against *Diplocarpon rosae* on rose, 694.
Kunkelia nitens on dewberry in England and Wales, 423.
Kurtakol, use of, against *Pestalozzia guepini* on *Rhododendron indicum*, 650.
Kyanization process of timber preservation, estimation of penetration of mercuric chloride in the, 15, 16.

Labrella pomi, see *Leptothyrium pomi*.
Lachnodius greeni associated with (?) *Polyporus coffeae* on coffee in Madagascar, 699.
Lactuca sativa, see Lettuce.
Lagerstroemia, rosette of groundnut affecting, in the Gambia, 697.
Larch (*Larix*), *Dasyscypha calycina* on, in England, 140.
—, *Fomes laricis* on, in Japan, 614.
—, *Melampsora larici-epitea* on, in England, 756.
—, *Polyporus schweinitzii*, *P. sulphureus*, and *Trametes pini* on, in Japan, 614.
Lasiosphaeria hispida on timber in Russia, 612.
— *spermoides* on timber in Russia, 616.
Late blight (non-parasitic) of beet in U.S.A., 148.
Latex treatment of mangosteen fruit, 62.

Lathyrus, *Uromyces pisi* on, in Germany, 760.
— *odoratus*, see Sweet pea.
Lavender (*Lavandula*), *Botrytis cinerea* on, in England, 107.
—, *Phoma lavandulae* on, in England, 375.
Lead, method of estimating, in plant protectives, 663.
— arsenate injury, 520, 560.
— —, use of, against *Bacillus tracheiphilus* on cucumber, 428 ; in fungicides, 161, 253, 661.
Leaf curl of cassava in Nyasaland, 806.
— — of chilli in India, 781.
— — of cotton (?) affecting zinnia in India, 573, 781 ; breeding against, 450 ; control, 239 ; effect of, on yield, 451 ; factors affecting, 451, 452 ; histological effects of, 452 ; incubation period of, 238 ; note on, 781 ; occurrence in the Sudan, 238, 450, 451 ; relation of, to mosaic, 239 ; study on, 238, 451 ; transmission of, 452 ; by *Bemisia gossypiperda*, 238, 573 ; to *Hibiscus* spp., 239 ; varietal resistance to, 450.
— — of cucurbits in India, 781.
— — of hollyhock in the Sudan, 239.
— — of *Pelargonium* in Germany, 459.
— — of potato in India, 781.
— — of tobacco, control, 676, 806 ; notes on, 76, 333 ; occurrence in E. Africa, 676 ; in Java, 333, 478, 676 ; in Nyasaland, 676, 806 ; in Rhodesia, 676 ; in S. Africa, 76, 676 ; in Tanganyika, 76 ; studies on, 478, 676 ; synonymy of, 478, 676 ; transmission of, by Aleurodidae, 76, 479, 806 ; by *Bemisia* (?) *gossypiperda*, 479, 676, 806 ; by grafts, 76, 479 ; to *Nicotiana* spp. and tomato, 479 ; types of, 478 ; virus of, affecting *Synedrella nodiflora* and *Zinnia elegans*, 479 ; *Vernonia*, 676, 806 ; (?) various hosts, 806.
— — of tomato in India, 781 ; in the Sudan, 239.
— fall of banana in New S. Wales, 585.
— hoppers, *Beauveria densa* and *Gonatorrhodiella coccorum* on, 179.
— roll of chilli in U.S.A., 356.
— — of potato, control, 667, 800 ; cytology of, 532 ; effect of, on acidity of tuber, 122 ; on assimilation, 467 ; on respiration, 319 ; on sprouting, 261 ; on yield, 23, 120, 319 ; factors affecting, 120, 261, 319, 429 ; histological effects of, 741 ; monograph on, 668 ; nature of virus of, 668 ; notes on, 596 ; occurrence in Belgium, 121 ; in Czecho-Slovakia, 68, 261 ; in Denmark, 467 ; in England, 122 ; in France, 23, 261 ; in Germany, 668 ; in Ireland, 532 ; in Kenya, 67 ; in New Zealand, 394 ; in Portugal, 68 ; in Scotland, 68 ; in Switzerland, 120 ; in U.S.A., 429, 531, 596, 667 ; in Wales, 200, 318, 319 ; studies on, 318, 319, 532 ; transmission of, by core grafts, 667 ; by *Empoasca fabae* and (?) *Epitrix cucumeris*, 531 ; by *Macrosiphum gei*, 200, (?) 394, 531, 667 ; by *M. pelargonii*, 667 ; by *Myzus circumflexus*, 200, 667 ; by *M. persicae*, 68, 200, 394, 531, 667 ; by true seed, 200 ; types of, 668 ; varietal resistance to, 23, 318.
[Leaf roll] of vine in Czecho-Slovakia, 280 ; in Italy, 21.
— scorch of currants in Denmark, 312 ; in Germany, 463.
— — of fruit trees in Victoria, 56.
— stripe of maize in Cuba and Hawaii, 591.
— yellows of coco-nut in St. Lucia, 27.
Leather, *Trichophyton* causing defects in, in Germany, 457.
Lecanium, *Gonatorrhodiella coccorum* on, 179.
—, (?) transmission of cassava mosaic by, in the French Cameroons, 152.
— *bambusicola*, *Hypocrella schizostachyi* on, 179.
— *corni*, transmission of vine mosaic by, in Czecho-Slovakia, 280.
— *hesperidum* in relation to sooty mould on orange in the Caucasus, 635.
Ledum glandulosum and *L. groenlandicum*, *Elsinoe ledi* on, in U.S.A., 184.
Leeks (*Allium porrum*), *Botrytis* on, in England, 759.
—, *Phoma terrestris* on, in U.S.A., 162.
—, *Phytophthora porri* on, in England and Scotland, 151.
—, *Urocystis cepulae* on, legislation against, in the British Isles, 543.
Legislation against *Actinomyces scabies* on, and bacterial rots of, potato in Portugal, 272.
— — bunchy top of banana in Egypt, 752.
— — cacao moulds in U.S.A., 416.
— — *Ceratostomella paradoxa* on banana, pineapple, and other fruits in the Argentine, 415.
— — — *ulmi* on elms in Austria, 416 ; in the British Isles, 543 ; in Germany, 208, 272, 415. 607 ; in various countries, 336.
— — *Cronartium ribicola* on pine in U.S.A., 208.
— — *Dothichiza populea* on poplar in Germany, 607.
— — *Dothidella ulei* on *Hevea* rubber in Dutch E. Indies, 608.
— — *Fusarium* on potato in Portugal, 272.
— — — *oxysporum cubense* on banana in Jamaica, 80.
— — *Guignardia bidwellii* on vine in Austria, 416.
— — infectious chlorosis of banana in New S. Wales, 416.
— — mushroom diseases in Spain, 751.
— — *Nectria galligena* on fruit trees in England, 80.
— — phony peach disease in U.S.A., 416, 543.
— — *Phyllosticta solitaria* on apple in the Argentine, 415.
— — *Phytophthora* on *Hevea* rubber in Dutch E. Indies, 608.

[Legislation against *Phytophthora*] *citrophthora* on citrus in the Argentine, 415.
— — — *infestans* on potato in Portugal, 272.
— — plant diseases in Austria, 415; in Belgium, 352; in British Honduras, 352; in the British Isles, 543; in Central America, 144; in Colombia, 272; in European countries, plea for more stringent, 543; in Greece, 607; in Guatemala, 608; in Mexico and Peru, 144; in S. Africa, 208; in Spain, 752; in Sweden, 352; in Turkey, 608.
— — poplar canker in Germany, 607.
— — *Pseudomonas citri* on citrus in the Argentine, 415; in U.S.A., 752.
— — *Puccinia graminis* on barberry in U.S.A., 80, 352.
— — *Rhabdocline pseudotsugae* on *Pseudotsuga taxifolia* in France and Germany, 215.
— — *Sclerotinia cinerea* and *S. fructigena* on fruit trees in England, 80.
— — *Sclerotium cepivorum* on onion, proposed in Egypt, 220.
— — *Spongospora subterranea* on potato in Brazil, 415; in Esthonia, 24; in Portugal, 272.
— — sugar-cane diseases in S. Africa, 264.
— — — mosaic in Peru, 225.
— — *Synchytrium endobioticum* on potato in Brazil, 415; in the British Isles, 543; in Dutch E. Indies, 608; in Esthonia, 24; in Germany, 597; in Jugo-Slavia, 272; in Portugal, 272; in Spain, 752.
— — *Urocystis tritici* on wheat in Canada, 544.
— — *Venturia inaequalis* on apple and *V. pirina* on pear in England, 80.
— regulating sale of plant protectives in Morocco, 144.
Lemon (*Citrus limonum*), *Alternaria* on, in Sicily, 449.
—, *Ascochyta corticola* on, in New Zealand, 365.
—, *Botryosphaeria ribis* can infect, 172; occurrence in Cyprus, 696.
—, *Colletotrichum gloeosporioides* on, in Uruguay, 226.
—, *Deuterophoma tracheiphila* on, in Sicily, 175.
—, *Dothiorella ribis* on, see *Botryosphaeria ribis* on.
—, *Gloeosporium* on, in Sierra Leone, 97.
—, *Haplosporella* on, in Tanganyika, 697.
—, *Ovularia citri* and *Penicillium glaucum* on, in Russia, 53.
—, *Phomopsis* (?) *citri* on, in Palestine, 172.
—, *Physalospora* (?) *fusca* on, in Tanganyika, 697.
—, *Phytophthora citrophthora* on, in Western Australia, 779.
—, *Pleospora herbarum* on, in Sicily, 449; *Macrosporium commune* conidial stage of, 449.
—, *Pseudomonas prunicola* can infect, 249.
[Lemon], *Septoria* (?) *depressa* on, in New S. Wales, 780.
—, *Sphaeropsis* on, in Tanganyika, 697.
—, *Sporotrichum citri* on, in Jamaica, 25; in Sierra Leone, 97.
Lentils (*Lens esculenta*), *Bacterium radiciperda* on, in Russia, 652.
—, *Botrytis fabae* can infect, 346.
—, *Fusarium* on, in Russia, 282.
—, *Uromyces fabae* on, in Cyprus, 695.
Lentinus lepideus on timber in Czecho-Slovakia, 341.
— —, use of, in tests of timber preservatives, 84, 487.
— *squamosus*, see *Lentinus lepideus*.
— — var. *suffrutescens* on timber in Czecho-Slovakia, 341.
Lenzites abietina, tests of various timber preservatives against, 84.
— *betulina* on oak in U.S.A., 497.
— *sepiaria*, tests of various timber preservatives against, 84.
— —, toxicity of extracts of pine to, 217.
— *striata* on timber in the Philippines, 218.
— *thermophila* (?) identical with *L. trabea*, 684.
— *trabea*, cultural characters of, 684.
— —, *L. thermophila* (?) identical with, 684.
— —, tests of various timber preservatives against, 84.
— —, *Trametes protracta* (?) identical with, 684.
Lepidoptera, *Acremonium griseum*, *Beauveria densa*, and *B. laxa* on, 179.
Leptoglossus balteatus transmitting *Bacillus* (?) *aroideae* on tomato in Trinidad, 610.
Leptomonas ganorae, see *Herpetomonas ganorae*.
—, see also *Phytomonas* (protozoal).
Leptosphaeria citricola on grapefruit (?) in Cuba, 544.
— *coniothyrium* on raspberry in England, 61.
— — on rose in Holland, 767.
— — on strawberry in Canada and U.S.A., 252.
— *culmifraga* on wheat in Belgium, 772.
— *dianthi* on *Dianthus tristis* in Bulgaria, 475.
— *herpotrichoides*, *Cercosporella herpotrichoides* confused with, 361.
— — on cereals in Germany, 559.
— — on wheat, effect of age of plant on susceptibility to, 291; occurrence in France, 361, 503.
— *sacchari* on sugar-cane in Mauritius, 127; in the Philippines, 203.
Leptostroma pinastri conidial stage of *Lophodermium pinastri*, 486.
Leptothrips mali, transmission of fig diseases by, in U.S.A., 522.
Leptothyrium pomi on apple in Germany, 657; *Gloeodes pomigena* (?) a stage of, 657.
— — on citrus in Palestine, 173; in U.S.A., 365.

Lettuce (*Lactuca sativa*), (?) *Bacterium marginale* on, in England, 143, 701.
—, (?) — *vitians* on, in England, 144.
—, *Bremia lactucae* on, in England, 491 ; viability of, 198.
—, *Corticium solani* on, in U.S.A., 491.
—, damping-off of, in U.S.A., 589.
—, *Micrococcus* and *Pseudomonas* on, in Czecho-Slovakia, 424.
—, *Rhizoctonia* on, in U.S.A., 589.
—, *Sclerotinia* on, in U.S.A., 589.
—, — *minor* on, in Germany, 492.
—, — *sclerotiorum* on, in U.S.A., 313.
—, *Sclerotium rolfsii* on, in U.S.A., 349.
Leucaena glauca, *Corticium solani* on, in Java, 601.
— —, diseases of, in Ceylon, 601.
— —, *Fomes lamaoensis* on, in Java, 72.
— —, — *lignosus* on, in the Belgian Congo, 2.
Leucostoma leucostoma synonym of *L. persoonii*, 60.
— *persoonii* can infect apricot, cherry, nectarine, and plum, 60.
— —, *L. leucostoma* synonym of, 60.
— — on peach in Japan, 60.
— — on plum in England, 61.
Leveillula taurica, see *Oidiopsis*.
Libertella betulina on birch in U.S.A., 337.
Light, effect of, on *Aspergillus niger*, *Botrytis cinerea*, *Cladosporium herbarum*, and *Clonostachys araucaria*, 737 ; on *Collybia dryophila*, 593 ; on *Corticium sasakii*, 539 ; on *Epicoccum purpurascens* and *Fusarium* from clover, 737 ; on *F. batatatis*, 593 ; on *F. poae* and *Helminthosporium gibberosporum*, 737 ; on *Macrophomina phaseoli*, 593 ; on *Metarrhizium anisopliae*, 782 ; on *Penicillium crustaceum* and *Phytophthora cambivora*, 737 ; on *Piricularia oryzae*, 800 ; on *Puccinia graminis*, 563, 629 ; on *P. lolii*, 564.
Lightning injury to tea in Ceylon, 749.
Lignasan, composition of, and use of, against mould and sap stain of timber, 816.
Ligniella pinicola on timber in Russia, 616.
Lignin, utilization of, by *Psalliota campestris*, 4.
Ligustrum ovalifolium, *Ganoderma applanatum* on, in Japan, 11.
Lilac (*Syringa vulgaris*), *Coccus* on, in France, 305.
—, *Phytophthora cactorum* and its var. *applanata* on, in U.S.A., 579.
—, — *syringae* on, in Europe, 579.
—, *Pseudomonas utiformica* can infect, 379.
—, *Stereum purpureum* on, in Germany, 302.
Lily (*Lilium*), *Botrytis cinerea* on, in Holland, 108.
—, — *elliptica* on, in Holland, 108, 243 ; in U.S.A., 429 ; strains of, 108, 243 ; study on, 243.
—, — *hyacinthi* on, in Holland, 108, 244.
—, *Corticium solani* can infect, 243.
—, *Cylindrocarpon radicicola* on, in Holland, 243.
[Lily], fungus (?) symbiont in seeds of, in Italy, 387.
—, *Fusarium* on, in Holland, 243.
— mosaic, control, 244 ; note on, 406 ; occurrence in Bermuda, 97 ; in Holland, 244 ; in Japan, (?) 244, 797 ; types of, 244 ; varietal susceptibility to, 244.
—, *Phytophthora* on, in Bermuda, 97.
—, *Septoria lilii* on, in Japan, 786.
—, virus disease of, in England, 591.
—, yellow flat of, in Bermuda, 97 ; in Holland, 244.
Lima bean, see *Phaseolus lunatus*.
Limacinia japonica on *Eurya japonica*, *E. ochracea*, oak, and orange in Japan, 329.
Lime (*Citrus aurantifolia* and *C. medica*), *Armillaria mellea* on, in Cyprus, 696.
—, *Gloeosporium limetticolum* on, breeding against, 284 ; control, 698 ; factors affecting, 698 ; occurrence in British Guiana, 26 ; in Dominica, 284 ; in St. Lucia, 698 ; in Trinidad, 283 ; varietal resistance to, 284.
—, *Sphaeropsis tumefaciens* on, (?) in Dominica, 283 ; in Jamaica, 625.
—, *Sphaerostilbe repens* on, in Dominica, 283.
—, withertip of, in Jamaica, 26.
Lime content of Bordeaux mixture in relation to potato yield, 428.
— deficiency in relation to *Armillaria mellea* on walnut in France, 95 ; to 'sand drown' of maize and tobacco in U.S.A., 470.
—, use of, as a drying agent against *Armillaria mellea* on citrus, 40 ; with 'flotate' sulphur to prevent agglomeration, 802.
— and ammonium sulphate, use of, for soil disinfection against *Phytophthora parasitica nicotianae* on tobacco, 750.
—, see also Fertilizers.
—, hydrated, use of, for Bordeaux mixture, 421 ; for 'instant' Bordeaux, 587.
—, —, with fish oil, use of, against *Venturia inaequalis* on apple, 161.
—, —, with zinc sulphate, use of, against *Bacterium pruni*, *Cladosporium carpophilum*, and *Sclerotinia americana* on peach, 660.
—, —, see also Milk of lime.
— -sulphur, cost of spraying pear trees with, in England, 113.
— — injury, 113, 114, 253, 494, 520, 561.
— — sprays, use of, in New Zealand, 655.
— — with aluminium sulphate spray, 113, 253.
— — with iron sulphate spray, 252.
— —, dry, use of, against *Venturia inaequalis* on apple, 520, 788 ; against orchard diseases in New Zealand, 655.
Lime tree (*Tilia*), *Ceratostomella ulmi* can infect, 275.
— —, *Fomes* (*Polyporus*) *connatus* on, in Norway, 137.
— —, — *vegetus* on, in Japan, 12.

Linseed (*Linum usitatissimum*), *Fusarium lini* on, in India, 427.
—, see also Flax.
Linseed oil as an adhesive, 41, 158.
— — as a constituent of wound dressings, 186, 612.
— — as a spreader, 587.
— —, use of, against *Actinomyces dermatonomus* on sheep, 457.
Liothrips ilex, transmission of fig diseases by, in U.S.A., 522.
Lisea fujikuroi renamed *Gibberella fujikuroi*, 332, 339.
Little leaf of coco-nut in St. Lucia, 27.
— — of pecan in U.S.A., 213.
— peach disease in U.S.A., 354, 789.
Locusts, *Alternaria* on, in Russia, 42.
—, *Aspergillus flavus* on, in the Gold Coast, 696.
—, — *niger*, *Cladosporium*, *Fusarium*, and *Helminthosporium* on, in Russia, 42.
—, *Isaria cicadae* on, 179.
—, *Mucor* on, in Russia, 42.
Loganberry (*Rubus loganobaccus*), *Bacterium tumefaciens* on, in England, 423.
—, *Didymella applanata* and *Plectodiscella veneta* on, in England, 61.
Lolium perenne, *Claviceps purpurea* in seed samples of, in Denmark, 304.
— —, *Diplodia gulneae* on, in Spain, 329.
Longicorn larvae, *Beauveria bassiana* on, 179.
Lonicera, *Microsphaera alni* on, *Cicinnobolus cesatii* parasitizing, in U.S.A., 377.
Lophodermium juniperinum on *Chamaecyparis thyoides* in U.S.A., 140.
— *pinastri* on pine in Finland, 486; in Norway, 136; *Leptostroma pinastri* conidial stage of, 486.
Loquat (*Eriobotrya japonica*), *Bacillus amylovorus* on, (?) in France, 305, 729; (?) in Italy, 117.
—, *Pestalozzia congensis* on, in China, 746.
Lowrie's process of timber preservation, 815.
Lucerne (*Medicago sativa*), *Aplanobacter insidiosum* on, breeding against, 499; effect of, on composition of host, 787; factors affecting, 787; histological effects of, 787; occurrence in U.S.A., 224, 499, 787; study on, 787; varietal susceptibility to, 224.
—, *Ascochyta medicaginis* on, in France, identity questioned, 654.
—, *Bacterium radiciperda* on, in Russia, 652.
—, *Cercospora* on, in U.S.A., 498.
— diseases, legislation against, in S. Africa, 208.
—, *Fusarium merismoides* var. *majus* on, in Czecho-Slovakia, 624; *F. betae* and *Pionnotes rhizophila* synonyms of, 624.
—, *Macrosporium sarcinaeforme* on, in Italy, 377; *Thyrospora sarcinaeforme* sensu Tehon and Daniels distinct from, 377.
—, *Olpidium trifolii* and *O. viciae* can infect, 720.
—, *Peronospora trifoliorum* on, in the Ukraine, 304; *P. aestivalis* considered correct name for, 304.
[Lucerne], *Phyllosticta medicaginis* on, in Italy, 653; *Ascochyta medicaginis* Fcl synonym of, 653; wrong determination of, in France, 654.
—, *Plenodomus meliloti* on, in Canada, 246.
—, *Pleospora herbarum* on, in S. Africa, 268.
—, reclamation disease of, in Denmark, 767.
— rosette in New S. Wales, 222.
—, winter injury of, in U.S.A., 224.
Luffa acutangula and *L. cylindrica*, *Diplodia adelinensis* on, in the Philippines, 316.
Lupin (*Lupinus*), chlorosis of, in Germany, 721.
—, *Fusarium* (?) *tracheiphilum* on, in Czecho-Slovakia, 624.
—, *Olpidium trifolii* and *O. viciae* can infect, 720.
—, *Phytophthora parasitica* on, in Italy, 766.
—, *Sclerotinia sclerotiorum* on, in Russia, 652.
Lycium ferocissimum, tomato spotted wilt can infect, 549.
— *halimifolium*, *Didymella lycopersici* can infect, 809.
Lycoperdon gemmatum on pine and spruce forming mycorrhiza, 527.
Lycopersicum esculentum, see Tomato.
Lygus in relation to leaf curl of *Pelargonium* in Germany, 459.
— *pratensis*, transmission of beet mosaic by, in the Ukraine, 90.
Lysol, use of, against mushroom diseases, 493.

Macrophoma candollei f. *ramosa* on box in Spain, 675.
— *gloeosporioides* on *Viburnum* and *V. davidi* in France, 651.
— *phoenicum* renamed *Diplodia phoenicum*, 571.
— *straminella* on rhubarb in Bulgaria, 745.
Macrophomina phaseoli can infect bean, mustard, *Phaseolus mungo*, and sunflower, 224.
— —, effect of irradiation on growth of, 593.
— — on bean, notes on, 171; occurrence in Tanganyika, 698; in U.S.A., 171, 711; study on, 711; varietal resistance to, 171.
— — on cotton in India, (?) 104, 224.
— — on cowpea in U.S.A., 711.
— — on groundnut in the Gambia, 27.
— — on maize in U.S.A., 171, 711.
— — on *Phaseolus lunatus* in U.S.A., 149.
— — on *Phaseolus lunatus* var. *sieva* in U.S.A., 711.
— — on potato in India, 126.
— — on sesame in India, 223.
— — on sorghum in India, 104, 560.
— — on tea in Nyasaland, 805.
(?) — — on tobacco in India, 104.
(?) — — on tomato in U.S.A., 27.
— — on violet in India, 426.

Macrosiphum gei, transmission of bean mosaic by, in U.S.A., 417; of potato leaf roll by, in U.S.A., 531, 667; in Wales, 200; of potato mosaic by, in U.S.A., 667.
— *pelargonii*, transmission of potato leaf roll and mosaic by, in U.S.A., 667.
Macrosporium on cumin in India, 282.
— on orange in the Caucasus, 636.
— *abutilonis* on *Abutilon avicennae* in Russian Central Asia, 183.
— *camelliae* on *Camellia japonica* in S. Africa, 267.
— *commune* conidial stage of *Pleospora herbarum*, 449.
— *globuliferum* distinct from *M. sarcinaeforme*, 377.
— *gossypinum* renamed *Alternaria gossypina*, 371.
— *medicaginis* and *M. meliloti* distinct from *M. sarcinaeforme*, 377.
— *porri* on onion in U.S.A., 224.
— *sarcinaeforme* on lucerne in Italy, 377; *M. globuliferum*, *M. medicaginis*, *M. meliloti* and *Thyrospora sarcinaeforme* sensu Tehon and Daniels distinct from, 377.
— *sarcinula* conidial stage of *Pleospora herbarum*, 268.
— — on cacao in the Dominican Republic, 30.
— *sesami* on sesame in Japan, 350.
— *tabacinum* Ell. & Everh., *Alternaria tabacina* (Ell. & Everh.) Hori distinct from, 135.
Madurella oswaldoi and *M. ramiroi* on man in Brazil, 242.
Magnesium deficiency in barley, oats, rye, and wheat in Germany, 101.
— — in relation to sand drown of maize and tobacco in U.S.A., 470; to soil acidity disease of cereals in Germany, 471.
Mahonia, see Barberry.
Maize (*Zea mays*), *Aplanobacter stewarti* on, in U.S.A., 446, 560.
—, (?) bacterial disease of, in Canada, 233.
—, *Bacterium dissolvens* on, in U.S.A., 446.
—, — *holci* can infect, 364.
—, *Diplodia macrospora* on, in the Philippines, 316; in Queensland, 157; (?) in Sierra Leone, 97; study on, 316.
—, — *zeae* on, control, 39, 297, 498, 778; factors affecting, 448; occurrence in Kenya, 159; in Queensland, 157, 778; in Rhodesia, 39; in U.S.A., 297, 447, 498; studies on, 447, 498.
— diseases in U.S.A., losses caused by, 770.
—, *Fusarium* on, in Kenya, 39, 163.
—, — (?) *aurantiacum* on, (?) in Austria, 234; in Czecho-Slovakia, 234.
—, — *culmorum* on, in U.S.A., 569.
—, *Gibberella fujikuroi* can infect, 332.
—, — *moniliformis* on, control, 570; factors affecting, 569; mixed inoculations with, 29; occurrence in the Argentine, 505; in New S. Wales, 222; in U.S.A., 569; study on, 569; variability of, 570; varietal susceptibility to, 505.
[Maize, *Gibberella*] *saubinetii* on, ascigerous stage of *Fusarium graminearum*, 234; control, 39, 297; cytology of, 234; effect of sugary gene on resistance to, 778; factors affecting, 234, 447, 778; mixed inoculations with, 29; notes on, 163, 431; occurrence in the Argentine, 505; in Guatemala, 431; in Kenya, 39, 163; in New S. Wales, 222; in Rhodesia, 39; in Uganda, 353; in U.S.A., 170, 297, 447, 778; studies on, 170, 234.
—, *Helminthosporium nodulosum* can infect, 426.
—, — *turcicum* on, in Kenya, 163.
— leaf stripe distinct from streak, 592; occurrence in Cuba and Hawaii, 591; specificity of the relationship between *Peregrinus maidis* and, 591.
—, *Macrophomina phaseoli* on, in U.S.A., 171, 711.
—, *Nigrospora* on, control, 297, 498; factors affecting, 448; occurrence in New S. Wales, 222; in U.S.A., 297, 448, 498, 778; study on, 448.
—, — *oryzae* on, in Rumania, 296, 711; *Sitotroga cerealella* in relation to, 296.
—, *Penicillium* on, in U.S.A., 778.
—, *Phoma zeicola* and *Phyllachora maydis* on, in Peru, 225.
—, *Physalospora zeicola* on, in U.S.A., 771; *Diplodia* imperfect stage of, 771.
—, *Physoderma zeae-maydis* on, in Guatemala, 431; in U.S.A., 771.
—, *Phytomonas rubrilineans* can infect, 473.
—, *Puccinia maydis* on, action of, on host tissues, 391; genetics of resistance to, 170; occurrence in Guatemala, 431; in U.S.A., 170.
—, *Pythium* can infect, 5.
—, — *adhaerens* and *P. angustatum* can infect, 605.
—, — *arrhenomanes* on, in U.S.A., 28.
—, — — var. *canadensis* can infect, 435.
—, — — var. *philippinensis* on, in the Philippines, 777.
—, *Rhizopus* on, in U.S.A., 778.
—, sand drown of, in U.S.A., 471.
—, *Sclerospora indica* on, in India, 546; formerly identified as *S. maydis*, 546.
—, — *sacchari* can infect, 425.
—, — *sorghi* on, in India, 635.
— streak distinct from leaf stripe, 592; filterability of virus of, 506; occurrence in S. Africa, 66, 591; in Tanganyika, 427, 591; relation of, to streak of *Digitaria horizontalis*, *Eleusine indica*, and sugar-cane, 66; transmission of, by *Cicadulina mbila*, 66, 592; by *C. zeae*, 592; types of, 592.
—, *Trichoderma* on, in U.S.A., 803.
—, *Ustilago zeae* on, antibiosis of bacteria to, 98, 103; cytology of, 569; effect of rare elements on susceptibility to, 507; of, on yield, 431; genetics of, 363, 446; heterothallism in, 363, 569; nature of resistance to, 507; nodal

infection by, 447; occurrence in Cyprus, 103; in France, 507; in Germany, 569; in Guatemala, 431; in U.S.A., 103, 363, 446, 447, 498; studies on, 363, 446, 447, 569.
[Maize], virus diseases of, resembling streak, in Tanganyika, 592.
Malachite, adhesiveness of, to seed grain, 441.
— green, toxicity of, to *Phytophthora* strains, 206.
— —, see also Dyes, aniline.
Malachra capitata, *Erysiphe malachrae* on, in Porto Rico, 512.
Maladie des taches en couronne of potato distinct from hereditary sprain, 199.
Malassezia furfur on man in the Argentine, 43; in Japan, 576; systematic position of, 576.
Malenite, toxicity of, to wood destroying fungi, 14.
Malvaviscus conzattii, resistance of, to *Phymatotrichum omnivorum*, 640.
Man, *Achorion* on, in the Argentine, 43.
—, — *schoenleini* var. on, in China, 44.
—, *Acrostalagmus cinnabarinus* on, in Italy, 577.
—, *Acrotheca pedrosoi* on, in the (?) Argentine, Brazil, (?) Cuba, (?) Russia, and (?) Sumatra, 645; transference of, to *Trichosporum* not accepted, 645.
—, *Actinomyces* on, in the Argentine, 43; in Germany, 242. (See also *Nocardia* on.)
—, — *allenbachii* on, in France, 514.
—, — *bovis* on, in Brazil, 242.
—, — *pulmonalis* on, in France, 515.
—, *Aspergillus fumigatus* on, in the Argentine, 43; in France, 181; pathogenicity of, to animals, 181.
—, — *oryzae* on, in Cyrenaica, 458.
—, *Blastomyces* [*Blastomycoides*] *dermatitidis* on, in the Argentine, 43, 643.
—, *Candida* on, in the British Isles, 645, 714, 715. (See also *Monilia* on.)
—, — *albicans* on, in U.S.A., 373; synonymy of, 375.
—, — *krusei* on, in the Argentine, 645.
—, — *pinoyi* on, in England, 714.
—, — *vulgaris* on, in U.S.A., 373; *C. tropicalis* synonym of, 373.
—, *Cephalosporium* on, in the Argentine, similarity of, to *Verticillium*, 516.
—, *Coccidioides* on, in Brazil, 643.
—, — *immitis* on, isolation of, from soil, 643; occurrence in the Argentine, 43, 515; in U.S.A., 643; referred to the Chytridineae, 515; study on, 643.
—, *Coniosporium onychophilum* on, in Italy, 45, 577.
—, *Cryptococcus* on, in the Argentine, 43.
—, — *mitis* and *C. psicrofilicus* on, in the Argentine, 644.
—, — *quasilinguae-pilosae* on, in U.S.A., 515.
—, *Debaryomyces mucosus* on, in France, 43.
—, *Epidermophyton* on, in the Argentine, 43.
[Man, *Epidermophyton*] *floccosum* on, factors affecting, 575; note on, 575; occurrence in China, 44, 458; in Porto Rico, 646.
—, — *inguinale* on, see *E. floccosum*.
—, *Halobyssus moniliformis* var. *parasiticus* on, in Italy, 578.
—, *Hormodendrum* (?) *fontoynonti* or *H.* (?) *olivaceum* on, in Porto Rico, 646.
—, *Hyalopus onychophilus* on, in Italy, 576; *Allantospora onychophila* renamed, 576.
—, *Indiella brumpti* on, in Brazil, 242.
—, *Madurella* and *M. ramiroi* on, in Brazil, 242.
—, *Malassezia furfur* on, in the Argentine, 43; in Japan, 576; systematic position of, 576.
—, *Microsporon* on, in the Argentine, 43.
—, — *audouini* on, notes on, 575.
—, — *ferrugineum* on, in China, 44.
—, — *lanosum* on, in Porto Rico, 646.
—, *Monilia* on, in China, 242. (See also *Candida* on.)
—, — *inexpectata* on, in the Argentine, 644, 645.
—, — *periungualis* on, in the Argentine, 714.
—, (?) *Mycoderma* on, in U.S.A., 373.
—, — *nobile* on, in France, 299.
—, mycoses of, French book on, 372; Italian book on, 43; in the Argentine, 515.
—, *Nocardia africana*, *N. bahiensis*, *N. brasiliensis*, *N. genesii*, *N. madurae*, *N. pelletieri*, and *N. somaliensis* on, in Brazil, 242. (See also *Actinomyces* on.)
—, *Phialophora verrucosa* on, in U.S.A., 645.
—, *Phoma conidiogena* on, in U.S.A., 374; *Alternaria polymorpha* and *P. alternariaceum* (?) identical with, 374.
—, *Rhinosporidium seeberi* on, in the Argentine, 515, 642; in India, 642; in U.S.A., 641; referred to the Chytridineae, 515.
—, *Saccharomyces jadini* on, in France, 642.
—, — *sternoni* on, in France, 457.
—, *Scedosporium apiospermum*, *S. magalhaesi*, and *Spondylocladium atro-olivaceum* on, in Brazil, 242.
—, *Sporotrichum beurmanni* on, (?) in U.S.A., 646; can infect carnation and rose, 647.
—, — *councilmani* on, (?) in U.S.A., 647; can infect carnation, 647.
—, — *gougeroti* on, in Porto Rico, 646, 647; can infect carnation, 647.
—, *Torula epizoa* on, in Russia, 241.
—, Torulopsidaceae in relation to diseases of, 642.
—, *Trichophyton* on, in the Argentine, 43; in Italy, 783; presence of conidia of, in pus, 782.
—, — *areolatum* on, in the Argentine, 783.
—, — *coccineum* var. *keio* on, in Japan, 646.
—, — *concentricum* on, in Porto Rico, 646.

[Man, *Trichophyton*] *glabrum* on, in Japan, 44.
—, — *gypseum* on, notes on, 575 ; hyphal fusions in, 458 ; occurrence in Porto Rico, 646.
—, — — var. *farinulentum* on, in Italy, 782.
—, — *langeroni* on, in Jugo-Slavia, 181, 576.
—, — *mentagrophytes* on, in England, 45 ; in Japan, 44.
—, — *plicatile* on, in Porto Rico, 646.
—, — *purpureum* on, in Japan, 44.
—, — *rosaceum* on, note on, 575.
—, — *rubrum* on, in China, 44, 458.
—, — *violaceum* on, note on, 575 ; occurrence in China, 44 ; in Russia, 241.
—, (?) *Verticillium* on, in the Argentine, 516.
Mandarin orange, see Orange.
Manganar-sulphur, use of, against *Venturia inaequalis* on apple, 427.
Manganese deficiency as the cause of Pahala blight of sugar-cane in Hawaii, 328.
— — disease (grey speck) of barley in S. Australia, 568.
— — — (— —) of cereals, control in Denmark, 768.
— — — (— —) of oats, factors affecting, 363 ; occurrence in Great Britain, 295 ; in Sweden, 363.
— excess disease of tobacco in U.S.A., 548.
— in relation to chlorosis of plants, 325 ; of trees in U.S.A., 499.
— sulphate, effect of, on pecan rosette in U.S.A., 684.
— —, use of, against manganese deficiency (grey speck) of cereals in Denmark, 768 ; of oats in Wales, 295.
Mango (*Mangifera indica*), *Bacillus mangiferae* on, in S. Africa, 698, 793 ; in Tanganyika, 698.
—, *Cytospora* on, in Ceylon, 223.
—, (?) *Erysiphe cichoracearum* on, in Jamaica, 625.
—, *Gloeosporium mangiferae* on, in Guatemala, 431 ; in S. Africa, 793 ; (?) identical with *Colletotrichum gloeosporioides*, 793.
—, *Oidium* on, in Ceylon, 223.
Mangosteen (*Garcinia mangostana*), *Diplodia* (?) *natalensis* on, and wastage of, in England (Burmese fruit), 62.
Manihot aipi and *M. dulcis*, see Cassava.
— *glaziovii*, mosaic of, in the Belgian Congo, 621.
— *palmata* and *M. utilissima*, see Cassava.
Maple, see *Acer*.
Marasmius palmivorus on oil palm in Malaya, 354.
— *perniciosus* on cacao, control, 433 ; effect of, on yield, 434 ; occurrence in British Guiana, 26 ; in Ecuador, 434 ; in Surinam, 703 ; in Trinidad, 433 ; study on, 433 ; translation of Stahel's paper on, 703.
— *sacchari* on sugar-cane in Porto Rico, 674.
[*Marasmius*] *semiustus* synonym of *M. stenophyllus*, 97.
— *stenophyllus* on banana in Jamaica, 25 ; in Sierra Leone, 97.
— — on plantain in Sierra Leone, 97.
Marrow, see Vegetable marrow.
Marssonina daphnes on *Daphne mezereum* in France, Germany, and Holland, 109.
— *juglandis* conidial stage of *Gnomonia leptostyla*, 79.
— *populi* on poplar in Norway, 136.
— *rosae* on rose in Poland, 459.
— *salicicola* on *Salix* in England, 139.
Matthiola incana var. *annua*, immunity of, from *Plasmodiophora brassicae*, 470.
— — — —, *Pseudomonas campestris* on, in Germany and U.S.A., 517.
Measles of apple attributed to a *Clasterosporium* in U.S.A., 248.
Meat, *Cladosporium herbarum*, *Mucor mucedo*, *Penicillium anormalium*, and *P. expansum* on, effect of carbon dioxide on growth of, 574.
—, *Sporotrichum carnis* on, factors affecting, 199, 574 ; occurrence in England, 199.
—, *Thamnidium chaetocladioides* and *T. elegans* on, effect of carbon dioxide on growth of, 574.
Medicago, *Sclerotinia trifoliorum* on, in Denmark, 768.
— *lupulina*, (?) *Pseudomonas pisi* on, in England, 701.
— *sativa*, see Lucerne.
— *scutellata*, *Sclerotinia trifoliorum* on, in Denmark, 304.
Medlar (*Mespilus germanica*), *Sclerotinia mespili* on, in England, 94.
Melampsora on *Salix* in England, 139.
— on *Salix helvetica*, *S. herbacea*, and *S. serpillifolia* in Italy, 412.
— on *Salix viminalis* in Czecho-Slovakia, 157.
— *alpina* on *Salix reticulata* in Italy, 412.
— *amygdalinae* on *Salix triandra* in England, 756.
— *apocyni* on *Apocynum venetum* in Russian Central Asia, 182.
— *arctica* on *Salix retusa* in Italy, 412.
— *euonymi caprearum* on *Salix caprea* in Italy, 412.
— *larici-epitea* on larch in England, 757.
— — on *Salix viminalis* in England, 756.
— *lini* on flax in the Argentine, 300.
— *reticulata* on *Salix reticulata* in Italy, 412.
— *ribesii-salicum* on *Salix caprea*, *S. grandifolia*, and *S. purpurea* in Italy, 412.
— — *-viminalis* on *Salix viminalis* in Italy, 412 ; in Spain, 329.
Melampsoraceae, inoculation tests with Japanese heteroecious, 405.
Melanconium sacchari on sugar-cane in Porto Rico and U.S.A., 543.
Melanobasidium synonym of *Elsinoe*, 724.
— *mali* synonym of *Elsinoe piri*, 724.
Melanospora stysanospora renamed *Microascus stysanosporus*, 6.
Melasmia rhododendri, *Rhytisma shiraiana* ascigerous stage of, 518.

Melica uniflora, *Physalospora festucae* on, in France, 722.
Melilotus alba, *Aplanobacter insidiosum* on, in U.S.A., 787.
— —, bacterial wilt of, in U.S.A., 428.
— —, *Cercospora* on, in U.S.A., 498.
— —, *Plenodomus meliloti* can infect, 303; occurrence on, in Canada, 246.
— —, *Pythium* on, in U.S.A., 429.
— —, ring-spot of tobacco affecting, in U.S.A., 133.
— —, *Sclerotinia trifoliorum* on, in Canada, 246.
— *officinalis*, (?) ring-spot of tobacco affecting, in U.S.A., 132.
Meliola citri p.p. synonym of *Hypnocapnodium mikanum*, 329.
— *osmanthi-aquifolii* on *Osmanthus aquifolium* in Japan, 330.
Melon (*Cucumis melo*), *Alternaria cucumerina* on, in U.S.A., 557.
—, *Bacillus aroideae* on, serological study of, in Japan, 700.
—, *Colletotrichum lagenarium* on, in Hungary, 619, 620; pseudopycnidial stage of, 620.
—, *Erysiphe cichoracearum* on, in Cyprus, 696.
—, — *polygoni* on, in France, 94.
—, *Fusarium niveum* on, in Hungary, 620.
— mosaic in U.S.A., 557; overwintering of, on weeds, 557.
—, *Pseudoperonospora cubensis* on, in S. Africa, 268.
—, ring-spot of tobacco affecting, in U.S.A., 132.
Mercuric acetate and bromide, effect of, on germination of wheat, 774.
— — — —, toxic action of, on spores of *Tilletia caries*, 501.
— chloride, absorption of mercury from, by treated wheat seed, 168.
— —, as a constituent of havre-fusariol, 163; of mycothanaton, 217.
— —, cost of, 146.
— —, *dosis tolerata* of, for tomato seed, 483.
— —, effect of, on germination of wheat, 168, 774.
— —, estimation of the penetration of, into kyanized timber, 15, 16.
— —, factors affecting germination of seed-grain treated with, 773.
— —, injury caused by, to potato tubers, 260.
— —, method of testing the strength of, in potato steeps, 671.
— —, toxic action of, on spores of *Tilletia caries*, 501.
— —, toxicity of, to *Armillaria mellea*, 681; to *Penicillium*, *P. brevicaule*, *P. candidum*, and *P. luteum*, 716; to timber rotting fungi, 83.
— —, use of, against *Actinomyces scabies* on potato, 259, 671; against *Armillaria mellea*, 681; against *Bacillus amylovorus* on apple and pear, 184; against *Bacterium malvacearum* on cotton, 454; against *Bact. marginatum* on gladiolus, 356; against *Bact. translucens* var. *undulosum* on wheat, 286; against *Bact. tumefaciens* on apple, 47; on raspberry, 428; against *Corticium solani* on potato, 260, 468, 534, 671; against *Fusarium* on *Narcissus*, 699; against *F. oxysporum cubense* on banana, 25; against *F. o. gladioli* on gladiolus, 356; against *Gibberella moniliformis* on cotton, 430; against *Monilochaetes infuscans* on sweet potato, 626; against *Mycogone perniciosa* on mushrooms, 493; against *Narcissus* diseases, 786; against *Phoma apiicola* on celery, 91; against *Phytophthora infestans* on potato, 494; against *Plasmodiophora brassicae* on cabbage, 17, 686; on cauliflower, 17; on crucifers, 146, 686; against seed-borne diseases, 253; against *Septoria gladioli* on gladiolus, 356; against sweet potato diseases, 599; against wheat bunt, 442; as a timber preservative, 83, 85, 815; for the disinfection of pruning tools, 428.
[Mercuric] nitrate, effect of, on the germination of wheat, 774.
— resinate, use of, against *Bacterium malvacearum* on cotton in U.S.A., 454.
— sulphate, effect of, on the germination of wheat, 774.
Mercurous chloride, seed disinfectant action of, 443.
— —, use of, against *Actinomyces scabies* on potatoes, 355, 626, 671; against *Bacterium marginatum* on gladiolus, 428; against *Bact. tabacum* on tobacco, 497; against *Corticium solani* on potato, 355, 626, 671; against *Narcissus* diseases, 786; against *Plasmodiophora brassicae* on crucifers, 146; against tobacco diseases, 497; against wheat bunt, 442.
Mercury, estimation of, in plant protectives, 314, 663.
—, persistence of, on disinfected seed-grain, 361.
— chlorophenol preparation, use of, against *Pestalozzia funerea* on conifers, 377.
— compounds, seed injury caused by, 279.
— —, stimulatory action of, 279.
— —, toxic action of, 501, 774.
— —, use of, against damping-off of vegetables, 279; against *Pestalozzia guepini* on *Camellia japonica*, 377; for disinfecting potatoes, 322.
— —, organic, persistence of, on seed-grain, 706.
— —, —, use of, against *Actinomyces scabies* on potato, 355; against *Corticium solani* on potato, 355, 534; against *Diplodia zeae* and *Gibberella saubinetii* on maize, 297; against *Pythium arrhenomanes* on maize, 29; against vegetable diseases, 279.
— —, —, see also Metaphen and Merthiolate.
— cyanide, toxicity of, to *Penicillium*, *P. brevicaule*, *P. candidum*, and *P. luteum*, 716.

[Mercury] rhodanide, as the active principle of urania, 169.
—, yellow oxide of, use of, against *Actinomyces scabies* and *Corticium solani* on potato, 626.
Mercutox, use of, against *Bacterium pruni* on peach, 355.
Merthiolate and metaphen, toxicity of, to *Bacillus amylovorus*, bacterium causing wilt of *Melilotus alba*, *Bacterium pruni*, and *Bact. tumefaciens*, 428.
Merulius lacrymans on timber, control, 83, 84, 217, 415, 487; experimental house for the study of, 487; factors affecting, 217, 343, 414; notes on, 487; occurrence in Denmark, 83; in England, 274, 343; in France, 217; in Germany, 84, 414; in Russia, 83; studies on, 217, 274.
— —, tests of various timber preservatives against, 84.
Mespilus, see Medlar.
Metadioxybenzol, toxicity of, to *Armillaria mellea*, 681.
Metarrhizium album on *Tettigoniella spectra*, 179.
— *anisopliae*, cultural study of, 782.
— — on *Curculio caryae* in U.S.A., 299.
— — on insects, 179.
— —, use of, against *Pyrausta nubilalis* on maize in Jugo-Slavia, 456, 782.
Methyl violet, use of, against *Bacterium pruni* on peach, 525. (See also Dyes, aniline.)
Mice, *Trichophyton mentagrophytes* on, in England, 45.
Michaelmas daisy (*Aster*), *Verticillium vilmorinii* on, in England, 623.
Microascus, synonymy of, 6.
— *albo-nigrescens*, *Acaulium albo-nigrescens* conidial stage of, 6.
— *niger*, *Acaulium nigrum* conidial stage of, 6.
— *schumacherii*, *Rosellinia schumacherii* renamed, 6.
— *stysanosporus*, *Melanospora stysanospora* renamed, 6.
— *stysanus*, action of ultra-violet rays on, 737.
Micrococcus on lettuce in Czecho-Slovakia, 424.
— *populi* on poplar in Italy, 612. (See also Canker of.)
Micro-lepidopteron, *Tilachlidium larvarum* on a, 179.
Microsphaera alni on *Lonicera*, *Cicinnobolus cesatii* parasitizing, in U.S.A., 377.
— — on pecan in U.S.A., 213.
— — var. *vaccinii* on catalpa, *Cicinnobolus cesatii* parasitizing, in U.S.A., 377.
— *quercina* on oak, control, 682; occurrence in Germany, 682; in Holland, 767; in Madagascar, 699; specific resistance to, 767.
Microsporon on man in the Argentine, 43.
— *audouini*, hyphal fusions in, as an aid to identification, 458.
— — on man, factors affecting, 575.
— *ferrugineum* on man in China, 44.
[*Microsporon*] *lanosum*, hyphal fusions in, as an aid to identification, 458.
— — on man in Porto Rico, 646.
Microstroma album on oak in Bulgaria, 745.
Microthyriella rubi on raspberry in England, 61.
Microxyphium purpuraefaciens and *M. theae* on tea in Java, 404.
Mikrosol, use of, against *Merulius lacrymans* and *Poria vaporaria* on timber, 84.
Mildew on canvas in U.S.A., 240.
Milesina dieteliana, note on, 340.
— *dryopteridis* on *Abies mayriana* and *Dryopteris viridescens* in Japan, 813.
— *jezoensis* on *Abies mayriana* and *Polypodium vulgare* in Japan, 340.
— *miyabei* on *Abies mayriana* and *Dryopteris crassirhizoma* in Japan, 813.
— *polypodophila*, note on, 340.
Milk, use of, as a spreader, 24, 380, 587.
— of lime, use of, after treatment of seed with acetic acid, 566. (See also Lime, hydrated.)
Millipedes, *Beauveria bassiana* and *Oospora subfasciculata* on, 179.
Mineral oil, see Oil, fuel, mineral; Paraffin.
Mites, see *Eriophyes*, *Tarsonemus*.
Moist chamber, improved type of, 197.
Monilia Gmelin regarded as a synonym of *Candida*, 476.
— in a butter churn in U.S.A., 181.
— in soil in France, 325.
— on cacao in Ecuador, 434.
— on man in China, 242.
— *fimicola* on mushrooms in Austria and Denmark, 493; in England, 94.
— *inexpectata* on man in the Argentine, 644, 645.
— *periunguealis* on man in the Argentine, 714.
— *pseudotropicalis* and *M. richmondi* synonyms of *Candida albicans*, 373.
—, see also *Candida*, *Sclerotinia*.
Moniliopsis aderholdi on *Hibiscus cannabinus* and *H. esculentus* in Russian Central Asia, 183.
Monilochaetes infuscans on sweet potato in U.S.A., 535, 626.
Monochaetia-like variants of *Pestalozzia funerea* on pine in U.S.A., 413.
—, two Chinese species of, 746.
Monopus caballeroi on *Salvia officinalis* in Spain, 675.
Morus, see Mulberry.
Mosaic of *Abutilon striatum*, see Chlorosis, infectious, of.
— of apricot in Czecho-Slovakia, 424.
— of bean, breeding against, 499; cocci and *Rickettsia*-like organisms associated with, 418; host range of, 417; occurrence in New S. Wales, 222; in Russia, 417; in U.S.A., 417, 499, 561; studies on, 417, 561; transmission of, by *Empoasca fabae*, 417; by *Macrosiphum gei*, 417; by seed, 417; types of, 561; varietal resistance to, 417, 561.
— of beet, control, 91; effect of, on yield, 90; intracellular bodies in, 89; occurrence in Czecho-Slovakia, 157.

424 ; in the Ukraine, 89 ; overwintering of, on weeds, 90 ; studies on, 89 ; transmission of, by *Aphis rumicis*, *Chlorita flavescens*, *Lygus pratensis*, and *Poeciloscytus cognatus*, 90 ; by knives, 90 ; types of, 89, 424.
[Mosaic] of begonia in Denmark, 768.
— of carnation in Japan, 797.
— of cassava, control, 762 ; etiology of, 20 ; losses caused by, 152 ; occurrence in the Belgian Congo, 20, 621, 762 ; in French W. Africa, 152, 762 ; in the Gold Coast, 762 ; in Java, 152 ; in Sierra Leone, 762 ; in West Africa, 152, 762 ; studies on, 152, 761, 762 ; synonymy of, 152 ; transmission of, by Aleyrodideae, 621 ; by grafting, 152, 762 ; by insects, 20, 762 ; (?) by *Lecanium* and termites, 152 ; varietal resistance to, 762.
— of chilli, control, 803 ; occurrence in Guatemala, 431 ; in Peru, 226 ; in U.S.A., 356, 803, 804 ; transmission of, by seed, 356.
— of citrus in Italy, 591.
— of *Coix lacryma-jobi* in New Guinea, 265.
— of cotton, relation of leaf curl to, 239.
— of *Crotalaria* in Hawaii, 116 ; transmission of, to pineapple, causing yellow spot, 116.
— of *Crotalaria juncea* in Japan, 797.
— of cucumber, control, 557 ; genetics of resistance to, 349 ; local lesions of, 334 ; note on, 406 ; occurrence in Czecho-Slovakia, 258 ; in U.S.A., 6, 334, 349, 557 ; overwintering of, on weeds, 557 ; relation of, to tobacco diseases, 6 ; to tomato streak, 6 ; study on, 349 ; transmission of, 334 ; types of, 6, 349 ; virus of, infecting tobacco in U.S.A., 6, 334, 406.
— of *Dolichos lablab* in India, 224.
— of *Hippeastrum equestre*, note on, 406.
— of hops, disappearance of, from Czecho-Slovakia, 624 ; notes on, 424, 539 ; occurrence in England, 424, 745.
— of hyacinth in Czecho-Slovakia, 624.
— of iris, cytology of, 796 ; occurrence in Japan, 797 ; in U.S.A., 430.
— of lily, control, 244 ; note on, 406 ; occurrence in Bermuda, 97 ; in Holland, 244 ; in Japan, (?) 244, 797 ; types of, 244 ; varietal susceptibility to, 244.
— of *Manihot glaziovii* in the Belgian Congo, 621.
— of melon in U.S.A., 557 ; overwintering of, on weeds, 557.
— of *Narcissus* in U.S.A., 578, 785 ; 'gray disease' renamed, 785.
— of *Pachyrrhizus angulatus* in the Philippines, 285, 691.
— of papaw in the Dominican Republic, 26 ; in Jamaica, 26, 625.
— of peach in Czecho-Slovakia, 424.
— of peas in England, 759.
— of petunia in U.S.A., 334.
— of *Phaseolus aconitifolius*, *P. acutifolius* var. *latifolius*, *P. angularis*, *P. calcaratus*, *P. coccineus*, *P. limensis*, *P. lunatus*, and *P. mungo*, 417.
[Mosaic] of plum in Czecho-Slovakia, 258, 424.
— of potato, biochemistry of, 200 ; control, 667, 767 ; cytology of, 532 ; effect of, on acidity of the tubers, 122 ; on sprouting, 261 ; on yield, 120, 319, 667 ; factors affecting, 120, 319, 429 ; occurrence in Belgium, 121 ; in Canada, 258 ; in Czecho-Slovakia, 68, 261 ; in England, 122, 394 ; in Germany, 121, 256 ; in Holland, 767 ; in Ireland, 532, 739 ; in Kenya, 67 ; in Peru, 226 ; in Portugal, 68 ; in Scotland, 68 ; in Switzerland, 120 ; in U.S.A., 200, 429, 595, 667 ; in Wales, 319 ; pathological effects of, 121 ; relation of, to healthy potato virus, 595, 596 ; to potato crinkle, 256, 739 ; to potato crinkle A, 739 ; to tobacco mosaic, 595 ; to tobacco veinbanding, 595, 596 ; of *x* virus to, 394, 594 ; of *y* virus to, 394, 594, 738 ; of *z* virus to, 594 ; studies on, 121, 200, 318, 667 ; transmission of, by core grafts, leaf mutilation, *Macrosiphum gei*, *M. pelargonii*, and *Myzus circumflexus*, 667 ; by *M. persicae*, 68, 667 ; by ultrafiltered virus, 256 ; types of, 256, 532, 594, 595, 596, 667 ; use of immature seed against, 767 ; varietal susceptibility to, 318.
— of *Primula denticulata* and *P. obconica* in Japan, 797.
— of raspberry in U.S.A., 381.
— of rhododendron in Germany, 244.
— of rose in Canada, England, and U.S.A., 374.
— of *Setaria sulcata* in S. Africa, 541.
— of soy-bean in Czecho-Slovakia, 424.
— of strawberry, disease resembling, in Canada, 252.
— of Sudan grass, note on, 406.
— of sugar-cane, breeding against, 265, 540 ; control, 128, 425, 541 ; Dominican pamphlet on, 74 ; effect of, on opacity and thickness of leaves, 541 ; on yield, 603 ; legislation against, in Peru, 225 ; notes on, 25, 223, 225, 403 ; occurrence in the Argentine, 128 ; in Cuba, 327, 603 ; in Hawaii, 539 ; in India, 223, 425 ; in Jamaica, 25, 625 ; in New Guinea, 265 ; in Peru, 225 ; in the Philippines, 203 ; in Porto Rico, 540, 804 ; in S. Africa, 540, 541 ; in Trinidad, 283 ; in U.S.A., 265 ; rate of spread of, 540 ; studies on, 265, 603 ; varietal resistance to, 25, 265, 327, 425, 540, 541, 603, 625, 804.
— of sweet potato in U.S.A., 535.
— of tobacco, control, 76 ; cytology of, 7, 8, 796 ; effect of enzymes on virus of, 334 ; of, on physiology of host, 592 ; factors affecting, 256, 806 ; iodine staining in study of, 333, 334 ; leaf spot symptoms of, 7 ; local lesions in, 333, 334 ; nature of virus of, 256, 334, 592, 751 ; nitrogen content of virus of, 406 ; occurrence in the

Argentine, 269; in Germany, 256; in Java, 750; in Nyasaland, 806; in Porto Rico, 7, 8, 677; in Queensland, 76; in Rumania, 607; in Sweden, 592; in U.S.A., 6, 7, 271, 333, 334, 406, 407, 595; purification of virus of, 406, 407; relation of, to 'corcovo' and 'polvillo', 270; to healthy potato virus, 271; to potato rugose mosaic, 595; to tobacco leaf necrosis, 596; to tomato mosaic, 271, 808; to tomato streak, 271, 596; to tomato virus disease, 808; size of virus particles of, 256, 407, 735; specificity of precipitin reaction to virus of, 406; spread of virus of, in tobacco and tomato tissues, 207; studies on, 7, 8, 256, 333, 334, 592, 750; transmission of, 334; to beans, 6; to *Nicotiana glauca*, 256; to pepper and tomato, 8; to *Pelargonium zonale*, 650; types of, 735, 750; undescribed symptoms of, 8; virus of, affecting weeds in U.S.A., 7.

[Mosaic] of tomato, attempted artificial cultivation of virus of, 257; control, 753; effect of, on yield, 10; inactivation of virus of, by pulverization, 677; leaf deforming principle of, 755; losses caused by, 226; nature of the virus principle in, 678; occurrence in New S. Wales, 753; in Peru, 226; in Trinidad, 610; in U.S.A., 10, 257, 271, 531, 677, 755; relation of, to tobacco mosaic, 271, 808; studies on, 10, 677, 678, 755; transmission of, by *Empoasca fabae*, *Myzus persicae*, *Tetranychus telarius*, and *Thrips tabaci*, 531; types of, 610.

— of vegetable marrow in England, 144.

— of *Vigna sesquipedalis*, 417.

— of vine in Czecho-Slovakia, 157, 280.

— -like disease of cassava attributed (?) to a bacterium in the Belgian Congo, 20.

Mottle leaf of citrus in U.S.A., 570.

Mottling of orange in Sicily, 173.

— of potato in Belgium, 121.

Moulds on butter wrapping paper in Austria, 716.

— on cacao, legislation against, in U.S.A., 416; occurrence in the Gold Coast, 703.

— on papaw in S. Africa, 522.

— on prepared rubber, control, 802.

— on timber in U.S.A., 816.

Mouse, see Mice.

Mucor in butter churns in U.S.A., 181.

— on barley in Canada, 294.

— on chilli in U.S.A., 804.

— on locusts in Russia, 42.

— on vegetables in Germany, 489.

— on walnut in England, 80.

— on wheat in Canada, 294.

— *abundans* can infect asparagus, bean, carrot, chilli, eggplant, onion, peas, potato, sweet potato, and tomato, 554.

— — on eggplant in U.S.A., 554.

— *circinelloides* can infect asparagus, chilli, peas, and tomato, 554.

[*Mucor circinelloides*] on bean in U.S.A., 554.

— *genevensis*, saltation in, produced by irradiation, 593.

— *hiemalis* can infect asparagus, chilli, bean, eggplant, onion, peas, and tomato, 554.

— — on peas in U.S.A., 554.

— *mucedo* on cacao in the Dominican Republic, 30.

— — on meat, effect of carbon dioxide on growth of, 574.

— —, resistance of, to extreme temperatures, 318.

— *racemosus* on cacao in the Dominican Republic, 30.

— — on copra in England, 175.

Mulberry (*Morus*), *Bacterium mori* on, in Bulgaria, 475; in Russian Central Asia, 756; *Bact. cubonianum* synonym of, 756.

—, *Cercospora moricola* on, in Italian Somaliland, 475.

—, *Cerotelium fici* on, in Tanganyika, 698.

—, *Clasterosporium* on, in Italian Somaliland, 476.

—, dwarf disease of, in Japan and Russian Central Asia, 756.

—, *Gibberella* [*baccata* var.] *moricola* on, in Holland, 95; in Italy, 281.

—, *Sclerotinia sclerotiorum* on, in Bulgaria, 485.

—, 'silver leaf' of, in Italian Somaliland, 476.

—, *Sphaeropsis mori* on, in Tanganyika, 698.

Mulsoid-sulphur, toxicity of, to *Sclerotinia americana*, 385.

Musa, *Omphalia flavida* on, in Guatemala, 431.

— *cavendishii*, see Banana.

— *paradisiaca*, see Plantain.

— *sapientum*, see Banana.

— *textilis*, bunchy top of, control, 46, 183, 300; factors affecting, 300; occurrence in the Philippines, 46, 183, 300; studies on, 46, 300; transmission of, by *Pentalonia nigronervosa*, 46; varietal resistance to, 300.

— —, (?) *Helminthosporium* on, in the Philippines, 301.

— —, root knot of, see *Heterodera radicicola*.

Mushrooms, *Aspergillus* on, in Austria, 493.

—, *Clitocybe candicans* in beds of, in Austria and Denmark, 493.

—, decomposition of manure by, 3.

—, diseases of, legislation against, in Spain, 751.

—, *Monilia fimicola* on, in Austria and Denmark, 493; in England, 94.

—, *Myceliophthora lutea* on, 493.

—, *Mycogone perniciosa* on, in Austria, Denmark, England, France, and U.S.A., 493.

—, *Penicillium* on, in Austria, 493.

—, *Pleurotus mutilus* in beds of, in Austria and Denmark, 493.

[Mushrooms], *Pseudobalsamia microspora*, *Pseudomonas tolaasii*, and *Trichoderma* on, 493.
—, *Verticilliopsis infestans* on, in (?) Austria and Denmark, 493.
—, *Verticillium* on, in U.S.A., 764.
Muskmelon, see Melon.
Mustard (*Brassica alba* and *B. nigra*), *Macrophomina phaseoli* can infect, 224.
—, *Plasmodiophora brassicae* on, in Germany, 490.
—, virus disease of, in the Philippines, 285.
Myceliophthora lutea on mushrooms, 493.
Mycocandida, a genus of the Torulopsidaceae, 476.
(?) *Mycoderma* on man in U.S.A., 373.
— *nobile* on man in France, 299.
Mycogone perniciosa on mushrooms in Austria, Denmark, England, France, and U.S.A., 493.
— *tulipae* on tulip in Italy, 388; resistance of the 'stolophyll' to penetration by, 529.
Mycological nomenclature, proposed new standards for, 473.
Mycorrhiza of *Cattleya*, *Rhizoctonia repens* forming, in Jamaica, 388.
— of cranberry, *Phoma radicis* forming, in U.S.A., 317.
— of orchids, Hymenomycetes and *Rhizoctonia* forming, 317.
— of pine, Basidiomycetes forming, in U.S.A., 527.
— of *Podocarpus falcatus* and *P. latifolius* in S. Africa, 258, 592.
— of *Podocarpus macrophylla* in Japan, 387.
— of spruce, Basidiomycetes forming, in U.S.A., 527.
— of trees, English translation of Melin's book on, 198.
— of tulip, resistance of 'stolophyll' to, in Italy, 528.
—, significance of, in saprophytic development, 317.
—, see also Root nodules.
Mycoses of man, French book on, 372; Italian book on, 43; occurrence in the Argentine, 515.
Mycosphaerella on *Pteridium aquilinum* in Scotland, 215.
—, phenology of, in Austria, 799.
— *areola* on cotton in U.S.A., 512; ascigerous stage of *Ramularia areola* (*Cercosporella gossypii*), 512.
— *brassicicola* on broccoli in England, 558.
— *caricae* on papaw in the Philippines, 662; *Sphaerella caricae* synonym of, 662.
— *caryigena* on pecan in U.S.A., 213, 552; ascigerous stage of *Cylindrosporium caryigenum* (= *Cercosporella caryigena*), 552.
— *dendroides* on pecan in U.S.A., 213.
— *fragariae* on strawberry in U.S.A., 463; in Victoria, 379.
— *grossulariae* on currants in Bulgaria, 475.
— *nigro-maculans* on cranberry in U.S.A., 188; *Ramularia nigro-maculans* conidial stage of, 188.
[*Mycosphaerella*] *phaseolicola* on soy-bean in Siberia, 88; may be perithecial stage of *Cercospora daizu*, 88.
— *pinodes* on peas, control, 17, 345; occurrence in England, 759; in France, 94; in U.S.A., 17, 345.
— — on sweet pea in England and Wales, 423.
— — on vetch in U.S.A., 345.
— *pomi* on apple, control, 355, 427; note on, 654; occurrence in U.S.A., 355, 427, 654.
— *rosigena* on rose in Queensland, 517.
(?) — *rubi* on blackberry in England, 61.
— *sentina* on pear in Switzerland, 694.
— *tulasnei*, ascigerous stage of *Cladosporium herbarum*, 310.
Mycothanaton, use of, against *Merulius lacrymans* on timber, 217.
Mycothecium (?) *advena* on coffee in Malaya, 769.
Mycotorula, a genus of the Torulopsidaceae, 476.
—, note on, 642.
— *albicans* on the hedgehog in France, 457.
Mycotorulaceae, classification of, 476.
Mycotoruloides, a genus of the Torulopsidaceae, 476.
— on the hedgehog in France, 457.
Mydaea, *Acremonium griseum* on, 179.
Mykanthine, use of, against *Merulius lacrymans* on timber, 217.
Myriangium bambusae on *Phyllostachys nigra* in China, 131.
Myrica carolinensis, *Cronartium comptoniae* can infect, 616.
— *gale*, *Cronartium comptoniae* on, in U.S.A., 616.
Myristica, *Ganoderma pseudoferreum* on, in Malaya, 402.
— *fragrans*, see Nutmeg.
Mystrosporium on *Cicer arietinum* in India, 425.
Myxobacterium, antibiosis of, to cereal smuts, 98.
Myxochytridineae, characters of the thallus in, 403.
Myxomycetes on Hymeniales, parasitism of, 594.
Myzus circumflexus, transmission of potato leaf roll by, in U.S.A., 667; in Wales, 200; of potato mosaic by, in U.S.A., 667.
— *persicae*, attempts to detect potato mosaic, leaf roll, and stipple-streak infections in, 68.
— —, transmission of curly top of beet to tomato by, in the Argentine, 562; (?) of peach yellows by, 521; of potato leaf roll by, in New Zealand, 394; in U.S.A., 531, 667; in Wales, 200; of potato mosaic by, in U.S.A., 68, 667; of tomato mosaic by, in U.S.A., 531.

Naphthalene, use of, against *Alternaria dianthi* and *Fusarium* on carnation, 497; against potato sickness of soil, 323.

Naphthols, use of, with glyceride oils, 464.
Napicladium calotropidis, a synonym of *Cercospora calotropidis*, 720.
Narcissus, *Armillaria mellea* on, in Great Britain, 376; in U.S.A., 786.
—, *Botrytis narcissicola* on, in Denmark, 460; in U.S.A., 786.
—, *Cylindrocarpon radicicola* on, in Denmark, 460; in Holland, 243.
—, *Fusarium* on, control, 376, 699; factors affecting, 786; occurrence in Holland, 376; in U.S.A., 699, 786; varietal resistance to, 786.
—, — *elegans* or *F. orthoceras* on, in Denmark, 460.
—, 'gray disease' of, see mosaic of.
—, *Hysterangium boudieri* on, in France, 23.
—, large scale speck of, in U.S.A., 786.
— mosaic, 'gray disease' renamed, 785; occurrence in U.S.A., 578, 785.
—, *Pachybasium bulbicolum* on, in Japan, 304; *Sporotrichum radicicolum* renamed, 303.
—, *Penicillium corymbiferum* and (?) other spp. on, in Denmark, 460.
—, *Ramularia macrospora* on, in England, 559.
—, — *vallisumbrosae* on, in U.S.A., 786.
—, *Rhizopus nigricans* on, in U.S.A., 786.
—, root plate rot of, in U.S.A., 786.
—, sclerotial fungus on, in U.S.A., 786.
—, (?) *Sclerotinia gladioli* on, in U.S.A., 786.
—, *Sclerotium delphinii* on, in U.S.A., 785.
—, (?) — *perniciosum* on, in Denmark, 460.
—, — *rolfsii* on, in U.S.A., 785.
—, *Stagonospora curtisii* on, in U.S.A., 786.
—, *Trichoderma narcissi* on, in Japan, 304; *Sporotrichum narcissi* renamed, 303.
—, virus disease of, in England, 591.
Nectarine (*Prunus persica*), *Leucostoma persoonii* can infect, 60.
—, *Puccinia pruni-spinosae* can infect, 249.
—, *Valsa japonica* can infect, 60.
Nectria on *Gliricidia* and *Inga* in Costa Rica, 369.
— on walnut in Canada, 411; in U.S.A., 411, 551.
— *cinnabarina* on apricot in Tasmania, 311.
— *galligena* on apple causing calyx rot in Switzerland, 247.
— — on ash in Norway, 136.
— — on fruit trees, legislation against, in England, 80.
— — on pear in Norway, 582.
— — var. *major* on ash in Holland, 12.
— *vanillae* on vanilla in Madagascar, 699.
Nectriella zingiberi and its var. *pallida* on ginger in the Philippines, 74.
Nematospora coryli on coffee, control, 353; differentiation between *N. gossypii* and, 572; occurrence (?) in Kenya, 572; in Tanganyika, 572; in Uganda, 353, 572; transmission of, by *Antestia* sp., 353.
[*Nematospora coryli*] on *Corylus avellana* in Italy and Sicily, 811.
— — on cotton in Rhodesia, 638; transmission of, by *Dysdercus*, 638.
— — on cowpea in Tanganyika, 698.
— — on *Phaseolus acutifolius* and pigeon pea in Tanganyika, 698.
— *gossypii* on coffee in Tanganyika, (?) Kenya, and Uganda, 572; differentiation between *N. coryli* and, 572.
— — on cotton in Russia, 42; in Uganda, 353.
Nematosporangium, taxonomy of the genus, 129.
— *aphanidermatum*, *N. arrhenomanes*, *N. epiphanosporon*, *N. hyphalosticton*, *N. leiohyphon*, *N. leucosticton*, *N. polyandron*, *N. rhizophthoron*, *N. spaniogamon*, and *N. thysanohyphalon* on pineapple, 129.
Neofabraea malicorticis on apple, factors affecting, 788; legislation against, in Spain, 752; occurrence in Denmark, 768; in U.S.A., 788; study on, 788.
— — on pear and quince, legislation against, in Spain, 752.
Nephotettix apicalis var. *cincticeps*, transmission of dwarf disease of rice by, in Japan, 324.
Nephrospora synonym of *Microascus*, 6.
Nereis diversicolor, *Bacterium tumefaciens* can infect, 499.
Nerium oleander, see Oleander.
Net necrosis of potato in Holland, 766.
Nettlehead of hops, 539; in England, 744.
Nettles (*Urtica*), *Pseudoperonospora humuli* can infect, 602.
Neurospora tetrasperma, serological studies on, 798.
New Jersey dry-mix, see Sulphur lime dry-mix.
Niagara aero and self-propelled power dusters, 286.
— D 6 and D 25 copper lime dusts, use of, against *Phytophthora infestans* on potato, 396.
Nicandra physaloides, *Didymella lycopersici* can infect, 809.
— —, tomato spotted wilt affecting, in S. Africa, 609.
Nicotiana, tomato spotted wilt can infect, 549.
— *acuminata* and other species, tomato aucuba mosaic virus can infect, 408, 754.
— *glauca*, tobacco 'kroepoek' can infect, 479; tobacco mosaic virus can infect, 256.
— *rustica*, *Bacterium* (?) *tabacum* on, in Russia, 77.
— —, tobacco 'kroepoek' can infect, 479.
— *suaveolens*, *Peronospora* on, in Western Australia, 607.
— *tabacum*, see Tobacco.
Nigrospora on maize, control, 297, 498; factors affecting, 448; occurrence in

New S. Wales, 222; in U.S.A., 297, 448, 498, 778; study on, 448.
[*Nigrospora*] *oryzae* on banana in England (on S. American fruit), 189.
— — on maize in Rumania, 296, 711; *Sitotroga cerealella* in relation to, 296.
Nipagin A, nipakombin, and nipasol, use of, as food preservatives, 466.
Nitrites in relation to the toxic action of *Fusarium* spp. on cotton, 513.
Nitrogen, see Fertilizers.
Nocardia africana, N. bahiensis, N. brasiliensis, N. genesii, N. madurae, N. pelletieri, and *N. somaliensis* on man in Brazil, 242. (See also *Actinomyces* on.)
Nosperal-lime, use of, against *Cladosporium cucumerinum* on cucumber, 688.
Nosperit, use of, against *Cercospora beticola* on beet, 348; against *Plasmopara viticola* on vine, 692; against *Polystigma rubrum* on damson, 660.
Nosprasit injury, 680.
—, use of, against *Cercospora beticola* on beet, 348; against *Cladosporium fulvum* on tomato, 680; against *Polystigma rubrum* on damson, 660.
Nothoscordum fragrans, Rhizoctonia on, in Italy, 529.
Nozzle (spraying), a new spherical type of, 733.
— (—), factors determining volume of spray passing through, 523.
Nummularia regia on beech, chestnut, oak, and *Platanus* in Spain, 611; *Hypoxylon regium* synonym of, 611.
Nutmeg (*Myristica fragrans*), *Coryneum myristicae* on, in Java, 673.

Oak (*Quercus*), *Aithaloderma japonica* on, in Japan, 330.
—, *Cytosporina manninoi* on, in Spain, 675.
—, *Endothiella* (?) *gyrosa* on, in Spain, 611.
—, *Fomes nigro-laccatus* on, in Russia, 680.
—, — *vegetus* and its var. *leucostratus* on, in Japan, 12.
—, *Ganoderma applanatum* on, in Japan, 11.
—, *Hydnum ochraceum* on, in U.S.A., 497.
—, *Hypnocapnodium quercifolium* on, in Japan, 330.
—, *Lenzites betulina* on, in U.S.A., 497.
—, *Limacinia japonica* on, in Japan, 329.
—, *Microsphaera quercina* on, control, 682; occurrence in Germany, 682; in Holland, 767; in Madagascar, 699; specific resistance to, 767.
—, *Microstroma album* on, in Bulgaria, 745.
—, *Nummularia regia* on, in Spain, 611.
—, *Panus rudis* and *P. stipticus* on, in U.S.A., 497.
—, *Phyllosticta lusitanica* on, in Spain, 329.
—, *Polyporus dryadeus* on, in Russia, 680.
—, — *japonicus* on, in Japan, 812.
—, — *obtusus* on, in U.S.A., 337; renamed *Trametes obtusa*, 337.
[Oak], *Polystictus versicolor* on, in U.S.A., 497.
—, *Stereum gausapatum* and *S. rameale* on, in U.S.A., 497.
—, *Treubiomyces japonicus* on, in Japan, 330.
Oats (*Avena* spp.), *Aphanomyces* on, in Holland, 127.
—, *Bacterium translucens* var. *undulosum* can infect, 434.
—, blast or blindness of, in Canada, 363.
—, *Dilophospora alopecuri* on, in Holland, 766.
—, *Fusarium* on, in Russia, 282.
—, — *avenaceum* on, in England, 623.
—, — *culmorum* on, in England, 623, 632.
—, — *scirpi* vars. *nigrans* and *pallens* on, in Great Britain, 504.
—, grey speck of, see manganese deficiency in.
—, *Helminthosporium avenae* on, in Great Britain, 294, 295.
—, — *nodulosum* can infect, 426.
—, — *sativum* can infect, 632; occurrence in New S. Wales, 503.
—, magnesium deficiency in, in Germany, 101.
—, manganese deficiency in, in Great Britain, 295; in Sweden, 363.
—, *Ophiobolus graminis* on, in Holland, 766.
—, *Puccinia graminis* on, breeding against, 31, 170, 498; factors affecting, 164, 362, 564; genetics of resistance to, 362; germination of teleutospores of, 164; infection of barberry by, in S. Africa, 164; occurrence in the Argentine, 358; in Brazil, 358; in Canada, 232, 362; in Czecho-Slovakia, 157; in Germany, 31; in New S. Wales, 170; in S. Africa, 164, 231; in Tunis, 436; in Uruguay, 358; in U.S.A., 437, 498; physiologic forms of, 170, 231, 232, 362, 437; study on, 362; varietal susceptibility to, 31, 170, 231.
—, — *lolii* on, artificial infection of, in resistance tests, 168; breeding against, 498; factors affecting, 31, 98, 704; occurrence in the Argentine, 358; in Brazil, 358; in Canada, 233; in Czecho-Slovakia, 157; in Germany, 31, 98; in Paraguay, 358; in Tunis, 436; in Uruguay, 358, 704; in U.S.A., 498; physiologic forms of, 233, 498; studies on, 98, 233, 498, 704.
—, *Pythium* on, in Canada, 294.
—, — *arrhenomanes* var. *canadensis* can infect, 435.
—, — *volutum* on, in Canada, 434.
—, reclamation disease of, in Denmark, 767; in Holland, 127; *Aphanomyces* in relation to, 127.
—, soil acidity disease of, in Germany, 471.
—, *Ustilago avenae* on, antibiosis of bacteria to, 98; control, 35, 163, 290, 568, 633; effect of, on susceptibility to *Puccinia graminis*, 362; genetics of resistance to, 233, 362, 445, 498; hybridization of, with *U. kolleri*, 37;

occurrence in Canada, 362; in Denmark, 163; in Germany, 65, 564; in Russia, 35, 290; in Sweden, 568; in U.S.A., 37, 233, 445, 498, 506, 633; physiologic forms of, 506; seed certification against, in Germany, 65; segregation in, 37; studies on, 37, 233, 362, 445, 506.
[Oats, *Ustilago*] *kolleri* on, antibiosis of bacteria to, 98; control, 633; effect of, on susceptibility to *Puccinia graminis*, 362; genetics of resistance to, 233, 362, 445, 498; hybridization of, with *U. avenae*, 37; occurrence in Canada, 362; in U.S.A., 37, 233, 362, 445, 498, 506, 633; physiologic forms of, 506; segregation in, 37, 118; studies on, 118, 362, 445; varietal resistance to, 506.
Obscure disease of *Acer platanoides* in U.S.A., 411.
— — of cotton in Italian Somaliland, 475.
Oedema of pecan in U.S.A., 213.
Oedocephalum on pine in Germany, (?) imperfect stage of *Fomes annosus*, 82, 145.
Oidiopsis on eggplant and tomato in Cyprus, 696.
— *sicula* (?) conidial stage of *O. taurica*, 281.
— — on chilli in Spain, 281, 605.
— *taurica* on *Hibiscus cannabinus* in Russian Central Asia, 183.
Oidium on chilli in Guatemala, 431.
— on cumin in India, 282.
— on mango in Ceylon, 223.
— on potato in Peru, 226.
— *abelmoschii* on *Hibiscus esculentus* in Russian Central Asia, 183.
— *chrysanthemi* on chrysanthemum, control, 680, 785; occurrence in Czecho-Slovakia, 624; in England, 680; in Germany, 785.
— *heveae* on *Hevea* rubber, control, 126, 401, 469, 470, 672, 801; effect of, on yield, 401; occurrence in Ceylon, 126, 401, 801; in Java, 469, 470, 672; in Malaya, 401, 744, 768.
Oil, Dormant, 4840, use of, with sulphur fungicides, against *Taphrina deformans* on peach, 519.
—, fuel, use of, for killing bananas affected with *Fusarium oxysporum cubense*, 585, 625; for timber preservation, 146, 488.
— (lubricating), emulsified, use of, with Bordeaux mixture, 519.
—, mineral, fungicidal properties of, 253.
—, prepared white, use of, as spreader, 587.
—, red spraying, use of, with Bordeaux mixture, 450.
—, see also Bordeaux oil emulsion, Paraffin, Petroleum.
Oil palm (*Elaeis guineensis*), *Ceratostomella paradoxa* on, in Malaya, 105, 769.
— —, *Fomes* on, in Malaya, 769.
— —, — (?) *lamaoensis* on, in Malaya, 105.
[Oil palm, *Fomes*] *lignosus* on, in Malaya, 769.
— —, — (?) *pachyphloeus*, *Ganoderma applanatum*, and *G. lucidum* on, in Malaya, 105.
— —, *Marasmius palmivorus* on, in Malaya, 354.
— —, stem rot of, in Malaya, 769.
Oiled wraps, oil content of, 659.
— —, use of, against apple scald, 658, 659.
Olea europaea, see Olive.
Oleander (*Nerium oleander*), bacteria in fungal infections of, 65.
—, *Pseudomonas savastanoi* var. *nerii* on, in Tanganyika, 698.
Olive (*Olea europaea*) diseases in Tunis, 153.
—, *Gloeosporium olivarum* on, in Uruguay, 226.
— oil, toxicity of, to *Sphaerotheca humuli*, 253.
(?) *Olpidium* on celery in England, 91.
— *trifolii* can infect bean, cowpea, groundnut, lucerne, lupin, peas, *Phaseolus angularis*, *Sophora japonica*, soy-bean, and *Vicia sativa* var. *angustifolia*, 720.
— — on clover in Czecho-Slovakia, 721; in Japan, 720; *Synchytrium trifolii* identical with, 721; *Urophlyctis bohemica* confused with, 721.
— *viciae* can infect bean, clover, cowpea, groundnut, lucerne, lupin, peas, *Phaseolus angularis*, *Sophora japonica*, soy-bean, and *Vicia sativa* var. *angustifolia*, 720.
— — on *Vicia unijuga* in Japan, 720.
Omphalia flavida on *Borrera* and *Cleome* in Guatemala, 431.
— — on coffee in Guatemala, 431; in Trinidad, 283.
— — on *Commelina*, *Inga*, and *Musa* in Guatemala, 431.
Onion (*Allium cepa*), *Bacillus* (?) *carotovorus* on, in Japan, serological study on, 700.
—, blast of, in U.S.A., 420.
—, *Botrytis* on, in England, 759.
—, *Colletotrichum circinans* on, in U.S.A., 392; reaction of other plants to, 392.
—, *Fusarium* on, in Canada, 278.
—, — (?) *zonatum* on, in U.S.A., 421.
—, *Heterosporium allii* var. *cepivorum* on, in England, 423.
—, *Macrosporium porri* on, in U.S.A., 224.
—, *Mucor abundans* and *M. hiemalis* can infect, 554.
—, *Penicillium glioladium-clonostachys* on, in U.S.A., 554.
—, *Peronospora schleideni* on, control, 420; factors affecting, 689, 690; occurrence in Irish Free State, 689; in S. Africa, 268; in U.S.A., 420; study on, 689; varietal resistance to, 689.
—, *Phoma terrestris* on, in U.S.A., 162.
—, *Pleospora herbarum* on, in S. Africa, 268.
—, *Rhizopus arrhizus* can infect, 554.
—, — *nigricans* on, in U.S.A., 554.
—, *Sclerotium cepivorum* on, in Egypt, 219.

[Onion], *Urocystis cepulae* on, in Bulgaria, 745; legislation against, in the British Isles, 543.
—, yellow dwarf of, in U.S.A., 420, 556, 760; properties of virus of, 420; studies on, 420, 556, 760; transmission of, by aphids, 760; by *Aphis maidis*, *A. rumicis*, *Cicadula sexnotata*, and *Rhopalosiphum prunifoliae*, 557.
Onobrychis sativa (= *O. viciaefolia*), *Ascochyta pisi* on, in Bulgaria, 475.
— —, (?) *Bacterium radiciperda* on, in Russia, 653.
Oospora in a butter churn in U.S.A., 181.
— *insectorum* on (?) *Aleyrodes*, a spider, and various pupae, 179.
— *pustulans* on potato in U.S.A., 670.
— *subfasciculata* on a millipede and a pupa, 179.
Ophiobolus, ascigerous stage of *Helminthosporium stenospilum*, 4.
— *graminis* on cereals, factors affecting, 799; notes on, 503; occurrence in Austria, 799; in Germany, 444; in New S. Wales, 503; study on, 444.
— — on oats in Holland, 766.
— — on wheat, control, 567; effect of, on yield, 291; factors affecting, 291, 361, 503, 708, 775; histological effects of, 293; notes on, 444, 503; occurrence (?) in Australia, 709; in Belgium, 772; in Canada, 291, 293, 708; in France, 503; in Germany, 361, 444, 775; in Western Australia, 567; studies on, 291, 361, 708; varietal susceptibility to, 291, 772.
— *herpotrichus* on barley in Czecho-Slovakia, 157.
— — on cereals, factors affecting, 799; occurrence in Austria, 799; in Germany, 559; in Switzerland, 495.
— — on rye in Czecho-Slovakia, 157.
— — on wheat in Czecho-Slovakia, 157; in France, 503.
— *miyabeanus*, action of, on cellulose, 800.
— — on rice in Japan, 536.
— —, see also *Helminthosporium oryzae*.
— *oryzinus* on rice in U.S.A., 469.
Ophiocordyceps, separation of, from *Cordyceps*, 179.
— *blattae*, *O. peltata*, *O. rhizoidea*, and *O. unilateralis*, *Cordyceps* spp. renamed, 179.
Opium poppy (*Papaver somniferum*), *Bacillus papaveri* on, in Bulgaria, 745.
— —, *Bacterium papavericola* on, in Bulgaria (?) 73, 475.
Orange (*Citrus aurantium*, *C. sinensis*, etc.), *Alternaria* on, in the Caucasus, 636.
—, — *citri* on, in Uruguay, 226.
—, *Antennella citrina* on, in Japan, 330.
—, *Capnodium citri* on, in the Caucasus, 636.
—, chlorosis of, in U.S.A., 571.
—, *Cladosporium* on, in the Caucasus, 635.
—, — *herbarum* var. *citricola* on, in Ceylon, 223.
—, *Clitocybe tabescens* on, in U.S.A., 365.
—, *Colletotrichum gloeosporioides* on, in Cyprus, 696; (?) in England, 366; in Uruguay, 226; stimulation of, by ammonia, 366.
[Orange], *Corticium solani* on, in Italy, 766.
—, *Deuterophoma tracheiphila* on, in Italy, 174, 175.
—, *Diplodia natalensis* on, in Peru, 226; in U.S.A., 771.
—, Florida scaly bark of, in China, Mexico, the Philippines, and U.S.A., 365; nail-head rust of fruit identical with, 365.
—, *Fusarium lateritium* var. *fructigenum* on, in Portugal and Spain, 307.
—, — *solani* can infect, 40.
—, *Gloeodes pomigena* on, in S. Africa, 105.
—, *Gloeosporium hesperidearum* on, in Uruguay, 226.
—, (?) *Glomerella cingulata* can infect, 313.
— gummosis in U.S.A., 770.
—, *Helminthosporium* on, in the Caucasus, 636.
—, *Hypnocapnodium mikanum* on, in Japan, 329; *Meliola citri* (*p.p.*) synonym of, 329.
—, *Limacinia japonica* on, in Japan, 329.
—, *Macrosporium* on, in the Caucasus, 636.
—, mottling of, in Sicily, 173.
—, *Penicillium digitatum* on, in England, 366; in S. Africa, 104.
—, — *italicum* on, in S. Africa, 104; in U.S.A., 236.
—, *Phoma citricarpa* on, in New S. Wales, 450.
—, *Phomopsis* on, in Cyprus, 696.
—, — (?) *citri* on, in Palestine, 172.
—, *Phytophthora citrophthora* on, in U.S.A., 779.
—, — *hibernalis* on, in U.S.A. and Western Australia, 779.
—, — *parasitica* on, in Uruguay, 226.
—, psorosis of, control, 367, 770; etiology of, 365; factors affecting, 366; occurrence in U.S.A., 365, 366, 367, 770; studies on, 366, 367; varietal susceptibility to, 366.
—, puffiness of rind of, in S. Africa, 104.
—, *Sclerotinia sclerotiorum* on, in Palestine, 172.
—, *Septoria* (?) *depressa* on, in New S. Wales, 780.
—, *Sporotrichum citri* on, control, 25, 284, 625; occurrence in Dominica, 284; in Jamaica, 25, 625; in Trinidad, 283.
—, surface blemishes of, in S. Australia, 780.
—, withertip of, in Jamaica, 26.
Oranit B X, use of, as spreader, 622.
Orchids, mycorrhiza of, Hymenomycetes and *Rhizoctonia* forming, 317.
Ornamental plants, German book on diseases of, 245.
Oryza sativa, see Rice.
Osmanthus aquifolium, *Meliola osmanthi-aquifolii* on, in Japan, 330.
Ovularia citri on lemon in Russia, 53.
Ovulariopsis gossypii (?) conidial stage of *Erysiphe malachrae* on cotton, 512.

Oxo-Bordeaux, use of, against *Venturia inaequalis* on apple, 161.
Oxybenzoic acid, ethyl and propyl esters of, as food preservatives in Germany, 466.

Pachybasium bulbicolum on crocus and narcissus in Japan, 304 ; *Sporotrichum radicicolum* renamed, 303.
Pachyrrhizus angulatus, mosaic of, in the Philippines, 285, 691.
Paeonia, see Peony.
Pahala blight of sugar-cane in Hawaii, attributed to iron or manganese deficiency, 328.
Paint and nicotine sulphate as a wound dressing, 51.
Palmyra palm (*Borassus flabellifer*), *Phytophthora palmivora* on, production of oospores in paired cultures of, 206.
Panicum frumentaceum, *Helminthosporium nodulosum* can infect, 426.
— *miliaceum*, *Helminthosporium nodulosum* can infect, 426.
— —, *Ustilago panici-miliacei* on, in Lithuania, 566.
Panus rudis and *P. stipticus* on oak in U.S.A., 497.
Papaver alpinum, *Bacillus papaveri* on, in Bulgaria, 745.
— *nudicaule*, *Pythium ultimum* on, in S. Africa, 331.
— —, tomato spotted wilt affecting, in Australia, 549.
— *orientale*, *Bacillus papaveri* on, in Bulgaria, 745.
— —, *Bacterium* (?) *papavericola* can infect, 73.
— *rhoeas*, *Pythium* (?) *artotrogus* on, in S. Africa, 331.
— *somniferum*, see Opium poppy.
Papaw (*Carica papaya*), *Bacillus papayae* on, in Java and the Molucca Islands, 193.
—, *Fusarium* on, in Peru, 226.
—, *Gloeosporium papayae* on, in Ceylon, 223.
—, *Helminthosporium papayae* on, in the Philippines, 662.
—, mosaic of, in the Dominican Republic, 26 ; in Jamaica, 26, 625.
—, moulds on, in S. Africa, 522.
—, *Mycosphaerella caricae* on, in the Philippines, 662 ; *Sphaerella caricae* synonym of, 662.
—, *Pythium aphanidermatum* on, in S. Africa, 330.
—, — *araisosporon* and *P. chamaihyphon* on, in Hawaii, 546.
—, — *irregulare*, *P. spinosum*, *P.* (?) *splendens*, and *P. ultimum* on, in S. Africa, 330.
—, yellow crinkle of, in Queensland, 157.
Paper, parchment, for wrapping butter, moulds on, in Austria, 716.
Para-crinkle of potato in England, 594 ; *y* or *y'z* viruses as constituents of, 594.
Paraffin, toxicity of, to *Sphaerotheca humuli*, 253.
[Paraffin], use of, against *Ceratostomella paradoxa* on sugar-cane, 542.
— wax residues, attempted water-proofing of timber by, 414.
—, see also Oil, Petroleum.
Paraffins, higher, as a source of carbon for *Aspergillus versicolor*, 589.
Paranitrophenol, use of, against moulding of sheet rubber, 802.
Parascorias spinosa on *Smilax* in the Philippines, 547.
Parashorea malaanonan, *Fomes pachyphloeus* on, in the Philippines, 613.
Paris green, adhesiveness of, to seed grain, 441.
— —, use of, against *Ustilago avenae* on oats, and against wheat bunt, 290.
Parkia javanica, *Fomes pachyphloeus* on, in the Philippines, 613.
Parodiella grammodes on *Crotalaria* in Ceylon, 749.
Parsley (*Petroselinum sativum*), (?) *Bacillus carotovorus* on, in Denmark, 768.
—, *Sclerotinia sclerotiorum* on, in Germany, 489.
Parthenium argentatum, *Phymatotrichum omnivorum* can infect, 177.
Passiflora, virus disease of, in S. Africa, 427.
Paxillus panuoides on timber in England, 274, 488.
— —, toxicity of fatty acids to, 816.
Peach (*Prunus persica*), *Bacterium pruni* on, control, 355, 520, 525, 584, 660 ; occurrence in U.S.A., 355, 520, 525, 583, 660 ; study on, 584.
—, *Cladosporium carpophilum* on, in U.S.A., 661.
—, *Clasterosporium carpophilum* on, control, 186 ; factors affecting, 799 ; occurrence in Germany, 186, 799 ; in Uruguay, 226 ; varietal resistance to, 186.
—, copper deficiency chlorosis of, in S. Africa, 724.
—, *Cytospora* on, in Canada, 790. (See also *Leucostoma* on.)
—, — *leucostoma* var. *cincta* on, in Bulgaria, 745.
—, — *rubescens* on, in Italy, 281.
—, die-back of, and *Fomes fulvus* on, in France, 23.
—, *Fusoma persicae* on, in Poland, 695.
—, *Leucostoma persoonii* on, in Japan, 60. (See also *Cytospora* on.)
—, little peach disease of, in U.S.A., 354, 789.
— mosaic in Czecho-Slovakia, 424.
—, *Phoma persicae* on, in S. Africa, 268.
—, phony disease of, legislation against, in U.S.A., 416, 543 ; note on, 462 ; occurrence in U.S.A., 416, 543.
—, 'plume' disease of, in Italy, 462.
—, *Pseudomonas mors-prunorum* on, in England, 726.
—, *Puccinia pruni-spinosae* on, in New S. Wales, 186 ; in U.S.A., 249.
—, red suture of, in U.S.A., 789.
— rosette in U.S.A., 356, 430.
—, *Sclerotinia americana* on, control, 661 ;

occurrence in Canada, 249, (?) 790; in U.S.A., 661; study on, 249; wound gum in relation to invasion by, 790.
[Peach, *Sclerotinia*] *cinerea* on, in Spain, 307.
—, soft suture of, attributed to spray injury in U.S.A., 520.
—, *Sporotrichum persicae* on, in Italy, 281.
—, spray injuries to, in U.S.A., 520.
—, *Taphrina deformans* on, control, 187, 519, 520; occurrence in Austria, 799; in Germany, 187; in U.S.A., 519, 520; phenology of, 799.
—, *Valsa japonica* on, in Japan, 60.
—, *Verticillium albo-atrum* on, in Bulgaria, 745.
—, virus disease of *Prunus japonica* can infect, 7.
— yellows, control, 790; note on, 406, 626; occurrence in U.S.A., 354, 406, 521, 626, 789; study on, 521; types of, 521; transmission of, (?) by insects, 521; not by pollen, 354; (?) from weeds, 521.
Peach-kernel oil, toxicity of, to *Sphaerotheca humuli*, 253.
Peanut, see Groundnut.
Pear (*Pyrus communis*), Anjou scald of, in U.S.A., 57.
—, *Armillaria mellea* on, in U.S.A., 40.
—, *Bacillus amylovorus* on, control, 184; leafhoppers in relation to, 306; legislation against, in the British Isles, 543; in Spain, 752; mode of infection by, 306; occurrence (?) in Italy, 281; in New Zealand, 184; in U.S.A., 111, 160, 306, 497; strains of, 160; studies on, 184, 306; varietal resistance to, 497.
—, bacterial disease of, in England, 22.
—, *Bacterium tumefaciens* on, in Russia, 47.
—, *Botrytis* on, in U.S.A., 519.
—, — (?) *cinerea* on, in U.S.A., 115.
—, (?) *Candida* on, in Cyprus, 696.
—, copper deficiency disease of, in S. Africa, 724.
—, *Diaporthe ambigua* on, in Holland, 95.
—, *Elsinoe piri* on, in Europe, 723; *Sphaceloma* stage of, 723; synonymy of, 724.
—, *Mycosphaerella sentina* on, in Switzerland, 694.
—, *Nectria galligena* on, in Norway, 582.
—, *Neofabraea malicorticis* on, legislation against, in Spain, 752.
—, *Physalospora cydoniae* on, in the Caucasus, 656.
—, *Phytophthora cactorum* on, in England, 111; in U.S.A., 429.
—, — *syringae* on, in England, 111.
—, *Pseudomonas utiformica* can infect, 379.
— scald in U.S.A., 54. (See also Anjou scald.)
—, *Sclerotinia fructigena* on, in Spain, 307.
—, *Septoria pyricola* on, in S. Africa, 267.
—, *Venturia pirina* on, ascospore discharge in, 112; control, 80, 112, 113, 115, 307, 494, 582, 660, 694; infection of spur wood and bud scales by, 659; of stems by, 115; legislation against, in England, 80; occurrence in Austria, 799; in the Channel Islands, 494; in England, 80, 113, 659; in Germany, 559; in Norway, 582; in Switzerland, 694; in Tasmania, 112, 115, 307; phenology of, 799; study on, 659; varietal susceptibility to, 659.
Peas (*Pisum*), *Aphanomyces euteiches* on, factors affecting, 626; occurrence in England, 623; in Jamaica, 26; in U.S.A., 626.
—, *Ascochyta pinodella* on, control, 17, 345; occurrence in New S. Wales, 222; in U.S.A., 17, 345.
—, — *pisi* on, in England, 759; in France, 94; in New S. Wales, 222; varietal susceptibility to, 94.
—, *Botrytis fabae* can infect, 346.
—, *Colletotrichum circinans* can infect, 392.
—, *Erysiphe polygoni* on, in U.S.A., 28.
—, *Fusarium anguioides* and *F. arthrosporioides* on, in Japan, 17.
—, — *martii* var. *minus* on, in Japan, 17.
—, — — var. *pisi* on, in England, 144.
—, — *orthoceras* var. *pisi* on, effect on transpiration of, 85; factors affecting, 555; nature of wilting in, 85, 86; occurrence in U.S.A., 85, 86, 430, 555; studies on, 85, 86; transmission of, by seed, 555; varietal resistance to, 86, 430.
—, — *redolens* on, in Czecho-Slovakia, 624.
—, — *sporotrichioides* on, in Japan, 17.
— mosaic in England, 759.
—, *Mucor abundans* and *M. circinelloides* can infect, 554.
—, — *hiemalis* on, in U.S.A., 554.
—, *Mycosphaerella pinodes* on, control, 17, 345; occurrence in England, 759; in France, 94; in U.S.A., 17, 345.
—, *Olpidium trifolii* and *O. viciae* can infect, 720.
—, *Peronospora viciae* on, in U.S.A., 75.
—, *Pseudomonas pisi* on, note on, 475; occurrence in Bulgaria, 475; in Hungary, 222; in New S. Wales, 222.
—, *Pythium* on, in Holland, 127.
—, — *adhaerens* can infect, 605.
—, reclamation disease of, in Holland, *Pythium* in relation to, 127.
—, *Sclerotium rolfsii* on, in U.S.A., 349.
—, *Septoria pisi* on, in New S. Wales, 222.
—, streak disease of, attributed to the pineapple yellow spot virus, in Hawaii and U.S.A., 218.
—, *Thielavia basicola* on, in England, 623.
—, *Uromyces pisi* on, in Germany, 760.
Pecan (*Carya pecan*), *Bacterium tumefaciens* on, in U.S.A., 213.
—, *Cercospora fusca* on, in U.S.A., 213.
—, *Cercosporella caryigena* on, see *Mycosphaerella caryigena* on.
—, *Cladosporium* on, in U.S.A., 552.
—, — *effusum* on, in U.S.A., 213.
—, *Gloeosporium caryae* var. *curvisporum*, *Gnomonia*, little leaf of, and *Microsphaera alni* on, in U.S.A., 213.
—, *Mycosphaerella caryigena* on, in U.S.A.,

213, 552 ; ascigerous stage of *Cylindrosporium caryigenum* (*Cercosporella caryigena*), 552.
[Pecan, *Mycosphaerella*] *dendroides* on, in U.S.A., 213.
—, oedema of, and *Phyllosticta caryae* on, in U.S.A., 213.
— rosette in U.S.A., 213, 683.
—, sand burn, winter injury, and wood rot of, in U.S.A., 213.
'Peh-sim' of tobacco in Sumatra, 477.
Pelargonium, *Bacterium pelargonii* on, in Holland, 767 ; (?) in U.S.A., 650.
—, — *tumefaciens* on, effect of potassium on, 358.
—, leaf curl of, in Germany, 459.
—, *Pythium splendens* on, in U.S.A., 650.
— *hederaceum*, virus disease of, in Belgium, 649.
— *zonale*, tobacco mosaic virus can infect, 649.
— —, virus disease of, in Belgium, 649; transmission of, to tobacco, 650.
Penetrol, use of, as a spreader, 152.
Penicillium, biochemistry of, 119.
—, decomposition of hemicelluloses by, 263.
— in butter churns in U.S.A., 181.
— in soil in U.S.A., 264, 803.
—, key for identification of, 483.
— on apple in the Caucasus, 53 ; in U.S.A., 656.
— on artificial silk, action of, 717.
— on bread in U.S.A., 710.
— on citrus in Australia, 105.
— on copra in England, 175.
— on hyacinth in Denmark, 460.
— on maize in U.S.A., 778.
— on mushrooms in Austria, 493.
— on narcissus in Denmark, 460.
— on tulip, control, 460; occurrence in Denmark, 460 ; in Italy, 388.
— on vegetables in Germany, 489.
— on walnut in England, 80.
—, resistance of the 'stolophyll' of *Tulipa silvestris* to, 529.
—, — of, to extreme temperatures, 318.
—, subsection *anomala* of, regarded as *Scopulariopsis*, 6.
— *anormalium* on meat, effect of carbon dioxide on growth of, 574.
— *brevicaule* on insects, 179.
— —, toxicity of dyes and metallic salts to, 715.
— *candido-fulvum* on copra in England, 175.
— (?) *candidum* on cacao in the Dominican Republic, 30.
— —, toxicity of dyes and metallic salts to, 715.
— *chrysogenum* in soil in France, 325.
— *citrinum* in soil in U.S.A., 264.
— —, production of colouring matters by, 119.
— *corymbiferum* on hyacinth, narcissus, and tulip in Denmark, 460.
— *crustaceum*, action of luminous and ultra-violet rays on, 737.
— *digitatum* in soil in U.S.A., 264.
— — on citrus, biochemistry of, 120; control, 506, 570; occurrence in Jamaica, 366 ; in U.S.A., 570.
[*Penicillium digitatum*] on orange in England, 366 ; in S. Africa, 104.
— *expansum* in soil in U.S.A., 264.
— — on apple in U.S.A., 658, 659.
— — on meat, effect of carbon dioxide on growth of, 574.
— *glaucum* on apple in the Caucasus, 53.
— — on lemon in Russia, 53.
— —, resistance of, to extreme cold, 318.
— —, toxicity of acetic, benzoic, salicylic, and sulphurous acids to, 466.
— *gliocladium-clonostachys* on onion in U.S.A., 554.
— *humicola* in soil in U.S.A., 264.
— *italicum* on citrus, diagnostic chemical product of, 120; occurrence in U.S.A., 570.
— — on orange in S. Africa, 104 ; in U.S.A., 236.
— *leucopus* on cacao in the Dominican Republic, 30.
— *lilacinum* in soil in France, 325.
— — on artificial silk, action of, 717.
— *luteum* in soil in U.S.A., 803.
— (?) — on cacao in the Dominican Republic, 30.
— —, toxicity of dyes and metallic salts to, 715.
— *mangini* in soil in France, 325.
— *nalgiovensis* in cheese in Czecho-Slovakia, 574.
— *notatum* on cacao in the Dominican Republic, 30.
— *pinophilum* and *P. purpurogenum* var. *rubri sclerotium* on artificial silk, action of, 717.
— (?) *roseum* on cacao in the Dominican Republic, 30.
— *spiculisporum* and *P. spinulosum*, biochemistry of, 119.
Pennisetum typhoideum, *Helminthosporium nodulosum* can infect, 426.
— —, *Sclerospora graminicola* on, in India, 507, 634.
— —, *Sphacelia* on, in the Gold Coast and Sierra Leone, 97.
Pentacme contorta and *P. mindanensis*, *Fomes pachyphloeus* on, in the Philippines, 613.
Pentalonia nigronervosa, *Cephalosporium crassum* on, 179.
— —, transmission of bunchy top of *Musa textilis* by, in the Philippines, 46 ; of heart rot of banana by, in Queensland, 157.
Pentathionic acid as the fungicidal agent of sulphur, 196, 465.
Peony (*Paeonia officinalis*) diseases in U.S.A., 649.
Pepper (betel), see *Piper betle*.
— (*Capsicum annuum*), see Chilli.
Peregrinus maidis, specificity of relationship between maize leaf stripe and, 591.
Perennial canker of apple attributed to winter injury in U.S.A., 656.
Peridermium pini on pine in Finland, 486.

Perisporiaceae, member of, on cheese in England, 516.
Peristomium synonym of *Microascus*, 6.
— *desmosporum* var. *verticillium*, systematic note on, 6.
Peronospora on *Nicotiana suaveolens* in Western Australia, 607.
— on tobacco, control, 9, 76, 209, 408, 607; notes on, 9; occurrence in Australia, 209; in Queensland, 76; in Victoria, 408; in Western Australia, 9, 607; viability of, 198, 209.
— *aestivalis*, see *P. trifoliorum*.
— *alsinearum* on *Cerastium viscosum* in U.S.A., 75.
— *brassicae*, see *P. parasitica*.
— *effusa* on spinach in U.S.A., 420.
— *hyoscyami* on *Hyoscyamus* in Rumania, 156.
— — on tobacco, notes on, 9; occurrence in the Ukraine, 156; in U.S.A., 9, 806.
— *manshurica* on soy-bean in Russian Central Asia, 316; in Siberia, 87.
— *parasitica* on cabbage, viability of, 198.
— — on radish in Czecho-Slovakia, 490; in Sweden, 220.
— *schachtii* can infect *Beta bourgaei*, *B. macrocarpa*, *B. maritima*, *B. patellaris*, *B. patula*, *B. procumbens*, *B. scutellaris*, *B. vulgaris* var. *abyssinica*, and *B. v.* var. *cicla*, 420.
— — on beet in U.S.A., 162, 419.
— *schleideni* on onion, control, 420; factors affecting, 689, 690; occurrence in Irish Free State, 689; in S. Africa, 268; in U.S.A., 420; study on, 689; varietal resistance to, 689.
— *sparsa* on rose, control, 459, 784; occurrence in Poland, 459.
— *trifoliorum* on lucerne in the Ukraine, 304; *P. aestivalis* considered correct name for, 304.
— *viciae* on peas in U.S.A., 75.
Peronosporaceae, list of Rumanian, 605.
Perseu, *Phytophthora cinnamomi* on, in Porto Rico, 356.
— *gratissima*, see Avocado pear.
Persimmon (*Diospyros kaki*), *Cercospora kaki* on, in Japan, 795.
—, *Fusicladium levieri* on, in Japan, 794; *F. diospyrae* synonym of, 795.
—, *Ganoderma applanatum* on, in Japan, 11.
—, (?) *Glomerella cingulata* can infect, 313.
Pestalozzia, Chinese species of, 746.
— on banana in England (on S. American fruit), 190.
— on *Rhododendron* in Japan, 518.
— *congensis* on loquat in China, 746.
— *funerea* on *Chamaecyparis* in U.S.A., 377.
— — on coffee in Kenya, 159.
— — on *Cryptomeria* and *Juniperus* in U.S.A., 377.
— — on pine, *Monochaetia*-like variants of, 413; occurrence in U.S.A., 377, 413.
— — on *Thuja* in U.S.A., 377.
— *gossypii* on cotton in China, 746.
[*Pestalozzia*] *guepini* on *Camellia japonica* in U.S.A., 377.
— (?) — on *Rhododendron indicum* in Germany, 650.
— — var. *vaccinii* on cranberry in U.S.A., 188.
— *hartigii* on walnut in England, 80.
— *palmarum* on coco-nut in the Philippines, 780.
— — on *Howea forsteriana* in U.S.A., 377.
— *sinensis* on *Ginkgo biloba* in China, 746.
— *stellata* on *Ilex opaca* in U.S.A., 377.
— —, spore germination tests of, 730.
Pestalozzina on cotton in Rhodesia, 638.
Petroleum, use of, against (?) *Tarsonemus floricolus* in fungus cultures, 118.
—, see also Oil, Paraffin.
Petroselinum sativum, see Parsley.
Petunia mosaic in U.S.A., 334.
—, rosette of groundnut affecting, in the Gambia, 697.
— *hybrida*, *Didymella lycopersici* can infect, 809.
— —, tomato spotted wilt can infect, 549.
— *parviflora*, *Cercospora canescens* on, 130.
— *violacea*, (?) ring spot of tobacco affecting, in U.S.A., 132.
Pezizella lythri on strawberry in Canada and U.S.A., 252; *Hainesia lythri* a stage of, 252.
Phacidium infestans on pine in Finland, 486; in Norway, 136.
— — on spruce in Finland, 214.
Phaeolus manihotis on cassava, (?) cotton, pigeon pea, and *Urena lobata* in Madagascar, 492.
Phakopsora vitis on vine in Ceylon, 223.
Phalaenopsis, asymbiotic germination of, in Jamaica, 388.
Phaseolus aconitifolius, mosaic of, 417.
— *acutifolius*, *Nematospora coryli* on, in Tanganyika, 698.
— — var. *latifolius*, mosaic of, 417.
— *angularis*, mosaic of, 417.
— —, *Olpidium trifolii* and *O. viciae* can infect, 720.
— *aureus*, *Pythium splendens* var. *hawaiianum* on, in Hawaii, 546.
— *calcaratus*, *P. coccineus*, and *P. limensis*, mosaic of, 417.
— *lunatus*, *Cercospora canescens* and *C. cruenta* on, 130.
— —, (?) *Colletotrichum caulicola* on, in U.S.A., 149.
— —, curly top of beet can infect, in U.S.A., 219.
— —, *Diaporthe phaseolorum* on, in U.S.A., 149.
— —, *Elsinoe canavaliae* on, in Cuba, 619.
— —, *Macrophomina phaseoli* on, in U.S.A., 149.
— —, mosaic of, 417.
— — var. *sieva*, *Macrophomina phaseoli* on, in U.S.A., 711.
— *multiflorus*, see Bean.
— *mungo*, *Cercospora cruenta* on, 130.
— —, *Macrophomina phaseoli* can infect, 224.

[*Phaseolus mungo*], mosaic of, 417.
— *vulgaris*, see Bean.
Phellinus cryptarum on timber in England, 423.
Phenol as a constituent of arborol, plantasan, 274; of etymolos, mykanthine, and raco, 217.
—, use of, against *Mycogone perniciosa* on mushrooms, 493.
Phenology of crops and diseases, bibliography of, 387.
Phialophora verrucosa on man in U.S.A., 645.
Phleospora trifolii and its var. *recedens* synonyms of *Stagonosporopsis trifolii*, 654.
Phleum pratense, *Claviceps purpurea* in seed samples of, in Denmark, 304.
— —, *Puccinia graminis* on, failure of, to infect barberry, 437, 628; occurrence in N. America, 437; in S. Africa, 231; in U.S.A., 628.
Phloem necrosis of coffee, see *Phytomonas leptovasorum* on.
Phlox diseases in U.S.A., 649.
Phlyctaena linicola on flax in the Argentine, 300; (?) in Siberia, 45.
Phoenix dactylifera, see Date palm.
Phoma, decomposition of straw by, 3.
— in a butter churn in U.S.A., 181.
— on apple in England, 51.
(?) — on date palm in France, Italy, N. Africa, and U.S.A., 572.
—, variation in, 477.
— *alternariaceum* (?) identical with *P. conidiogena*, 374.
— *apiicola* on celery in England, 91.
— *betae* on beet, control, 356, 760; effect of, on yield, 760; factors affecting, 490, 760; note on, 148; occurrence in Germany, 559; in Holland, 148; in the Ukraine, 760; in U.S.A., 356, 490.
— *citricarpa* on orange in New S. Wales, 450.
— *conidiogena* on box in U.S.A., 581.
— — on man in U.S.A., 374; *Alternaria polymorpha* and *P. alternariaceum* (?) identical with, 374.
— *destructiva* on chilli in U.S.A., 803.
— — on tomato in Trinidad, 610.
— *exigua* on flax in Esthonia, 25.
— *lavandulae* on lavender in England, 375.
— *lingam* on cabbage in Denmark, 489; in S. Africa, 267.
— — on cauliflower in Denmark, 489.
— (?) — on rape in Holland, 95.
— — on swedes in Denmark, 489; in Wales, 345.
— — on turnip in Canada, 276; in Denmark, 489.
— *lycopersici* on tomato in Esthonia, 25.
— *persicae* on peach in S. Africa, 268.
— *radicis* on cranberry in U.S.A., 317.
— *terrestris* on leeks and onion in U.S.A., 162.
— *zantedeschiae* on *Zantedeschia aethiopica* in S. Africa, 267.
— *zeicola* on maize in Peru, 225.
Phomopsis on *Acer palmatum* in U.S.A., 411.
— on citrus in Jamaica, 365, 508.
— on elm in U.S.A., 212.
— on orange in Cyprus, 696.
— on tomato in Trinidad, 610.
— *ambigua*, see *Diaporthe ambigua*.
— *citri* on citrus and grapefruit in U.S.A., 771.
— (?) — on lemon and orange in Palestine, 172.
— *coneglanensis* on apple, factors affecting, 52.
(?) — *juniperovora* on *Juniperus* and *Thuja* in Holland, 96.
— *kalmiae* on *Kalmia latifolia* in U.S.A., 649.
— *tuberivora* on potato in Canada, 671.
— *vaccinii* pycnidial form of *Diaporthe vaccinii*, 188.
— *vexans* on apple, factors affecting, 52.
— — on eggplant in U.S.A., 356.
Phony disease of peach, note on, 462; legislation against, and occurrence in U.S.A., 416, 543.
Phorbia cilicrura in relation to *Bacillus phytophthorus* on potato in U.S.A., 259.
Phosphorus, see Fertilizers.
Photinia villosa, *Bacillus amylovorus* can infect, 306.
Phragmidium, N. American species of, 405.
— *mucronatum* on rose, control, 459, 578, 694; occurrence in France, 578; in Poland, 459; in Switzerland, 694; varietal susceptibility to, 578.
— *subcorticium*, see *P. mucronatum*.
— *violaceum* on blackberry in England, 61.
Phycomyces blakesleeanus, saltation in, produced by irradiation, 593.
Phycomycetes, Russian book on, 273.
—, some aquatic, of U.S.A., 675.
Phyllachora agrostidis synonym of *Scirrhia agrostidis*, 722.
— *maydis* on maize in Peru, 225.
— *pomigena* synonym of *Gloeodes pomigena*, 657.
— *sylvatica* on *Festuca ovina* in France, 722.
Phyllostachys nigra, *Myriangium bambusae* on, in China, 131.
— *reticulata*, *Aithaloderma phyllostachydis* on, in Japan, 330.
Phyllosticta on *Eucalyptus* in S. Africa, 268.
— on tobacco in Nyasaland, 806.
—, phenology of, in Austria, 799.
— *albo-maculans* on quince in Spain, 329.
— *antirrhini* on *Antirrhinum majus* in Bulgaria, 745.
— *asteris* on aster (China) in Italy, 375.
— *cannabis* on hemp in Bulgaria, 745.
— *caryae* on pecan in U.S.A., 213.
— *colocasiae* on *Colocasia antiquorum* in the Gold Coast, 763.
— — on *Xanthosoma sagittifolium* in the Gold Coast, 696, 763.
— *cyclaminis* on cyclamen in Germany, 650.
— *ficicola* on fig in S. Africa, 268.

[*Phyllosticta*] *gossypina* on cotton in Rhodesia, 638.
— *halepensis* on *Andropogon halepensis* in Spain, 329.
— *kalmifolia* on *Kalmia latifolia* in U.S.A., 649.
— *lusitanica* on oak in Spain, 329.
— *maximi* on *Rhododendron*, *R. ledifolium*, and *R. obtusum* in Japan, 518.
— *medicaginis* on lucerne in Italy, 653; *Ascochyta medicaginis* Fel synonym of, 653; wrong determination of, in France, 654.
— *nicotiana* on tobacco in Rhodesia, 206.
— *pirina* on apple in Kenya, 159; in Tasmania, 114.
— *psidii* on guava in S. Africa, 268.
— *rabiei* renamed *Ascochyta rabiei* (q.v.), 150.
— *richardiae* on *Zantedeschia aethiopica* in Great Britain, 517.
— *rosae* on rose in Queensland and Victoria, 516.
— *rosarum* on rose (?) in Australia, 517.
— *ruborum* on *Rubus* in Bulgaria, 475.
— *sojaecola* pycnidial stage of *Pleosphaerulina sojaecola*, 88.
— *solitaria* on apple, control, 520, 587; legislation against, in the Argentine, 415; in Spain, 752; note on, 654; occurrence in U.S.A., 520, 583, 587, 654; studies on, 583.
— *tabaci* on tobacco in Rhodesia, 206; in Rumania, 156.
Phymatotrichum omnivorum can infect carrot, 640; cowpea, *Crotalaria incana*, *C. spectabilis*, and *C. striata*, 177; *Hibiscus esculentus*, 640; *Parthenium argentatum*, and *Sesbania*, 177.
— — in soil in Russia, 42.
— — on *Aplopappus heterophyllus* and *Chamaesyce albomarginata* in U.S.A., 370.
— — on cotton, control, 240, 370; cycles of growth of, 240; effect of date of planting on, 639; of, on leaf temperature, 573; host range of, 177, 370, 640; *Hydnum* not a stage of, 27; indigenous in U.S.A., 370; notes on, 27; occurrence in U.S.A., 27, 176, 177, 240, 298, 370, 573, 639, 640; physiologic forms of, 176; studies on, 177, 370, 639, 640; viability of, 177.
— — on date palm in U.S.A., 713.
— — on *Sphaeralcea ambigua* in U.S.A., 370.
— —, toxicity of various disinfectants to, 177.
Physalis, tomato spotted wilt affecting, in S. Africa, 609.
— *francheti*, *Didymella lycopersici* can infect, 809.
— *minima*, *Bacterium solanacearum* on, in S. Africa, 123.
— *peruviana*, tomato bunchy top can infect, 210, 482.
— —, tomato spotted wilt can infect, 549.
Physalospora cydoniae on apple in Tasmania, 114; in U.S.A., 560.
[*Physalospora cydoniae*] on elm in U.S.A., 212.
— — on fruit trees in Russia, 656.
— — on pear in the Caucasus, 656.
— *festucae* on *Melica uniflora* in France, 722.
— (?) *fusca* on lemon in Tanganyika, 697.
— *miyabeana* can infect *Salix americana*, *S. purpurea*, and *S. vitellina*, 214.
— on *Salix* in England, 139, 21.
— *zeicola* on maize in U.S.A., 771; *Diplodia* imperfect stage of, 771.
Physiological blackening of potato in England, 93.
— breakdown of apple in U.S.A., 53.
— characterization of fungus species, 736.
— disease of *Hevea* rubber in the Belgian Congo, 2.
— — of *Solanum demissum* in Mexico and U.S.A., 672.
Physoderma, morphology of, 403.
— *zeae-maydis* on maize in Guatemala, 431; in U.S.A., 771.
Phytomonas (bacterial) *berberidis* on barberry in U.S.A., 109.
— *melophthora*, see *Pseudomonas melophthora*.
— *prunicola*, see *Pseudomonas prunicola*.
— *rathayi*, see *Bacterium rathayi*.
— *rubrilineans* can infect *Andropogon australis*, *A. halepensis*, maize, sorghum, *Sorghum verticilliflorum*, and Sudan grass, 473.
— — on sugar-cane, control, 328; losses caused by, 542; occurrence in Cuba, 327; in Hawaii, 328, 674; in Kenya, 159; in Queensland, 473, 542; study on, 473; varietal susceptibility to, 327.
— *rubrisubalbicans* on sugar-cane in Queensland and U.S.A., 473.
— *viburni* on *Viburnum dentatum*, *V. opulus*, and *V. tomentosum* in U.S.A., 110.
— (protozoal) *françai* in cassava in Brazil, 254.
— *leptovasorum* on coffee in (?) Brazil, 637; in (?) British Guiana and Surinam, 237, 637.
—, see also *Leptomonas*.
Phytopathology, Russian text-book on microscopical technique of, 590.
—, use of medical terminology in, deprecated, 315.
—, see also Plant diseases, Plant protection.
Phytophthora on apple in Italy, 765.
(?) — on banana in Italian Somaliland, 765.
— on cactus in Germany, 651.
— on carnation in Ceylon, 223.
— on *Cinchona* in India, 426.
— on citrus in India, 235.
— on *Hevea* rubber, control, 432, 802; legislation against, in Dutch E. Indies, 608; occurrence in Ceylon, 802; in Indo-China, 432; in Java, 71.
— on *Hibiscus sabdariffa* in India, 158, 426.
— on lily in Bermuda, 97.

[*Phytophthora*] on *Piper betle* in India, 158, 283.
— on sandalwood in India, 158, 509.
— on tobacco in Mauritius, 496.
— on tomato in Trinidad, 610.
— *arecae* on areca palm in India, 158, 509.
— *cactorum* on apple in England, 111.
— — on lilac in U.S.A., 579.
— — on pear in England, 111; in U.S.A., 429.
— — on strawberry in England, 559.
— (?) — on walnut in U.S.A., 339.
— — var. *applanata* on lilac in U.S.A., 579.
— *cambivora*, action of luminous rays on, 737.
— — on avocado in S. Africa, 331.
— — on chestnut in Italy, 485; parasitic action of, 391.
— *capsici* on chilli in Porto Rico and U.S.A., 803.
— *cinnamomi* on *Persea* in Porto Rico, 356.
— — on *Rhododendron* in U.S.A., 356, 627.
— *citrophthora* on *Citrus*, control, 779, factors affecting, 779; legislation against, in the Argentine, 415; occurrence in S. Africa, 331; in Western Australia, 779.
— — on grapefruit in S. Africa, 331; in U.S.A., 779.
— — on lemon in Western Australia, 779.
— — on orange in U.S.A., 779.
— *colocasiae* on *Piper betle* in Malaya, 769.
— *hibernalis* on citrus in New S. Wales, 222.
— — on orange in U.S.A. and Western Australia, 779.
— *infestans* on potato, breeding against, 598, 667; control, 125, 322, 396, 397, 494, 670, 766, 769; effect of, on acidity of the tuber, 122; factors affecting, 71; legislation against, in Portugal, 272; losses caused by, 66, 124, 598; notes on, 225, 766; occurrence in Austria, 71, 322; in the Channel Islands, 493; in Cyprus, 670; in England, 94, 122, 123, 559, 598; in Germany, 65, 66, 559, 667; in Guatemala, 431; in Holland, 96, 766; in Ireland, 396; in Jamaica, 397; in Malta, 769; in Norway, 669, 670; in Peru, 225; in Tasmania, 322; in U.S.A., 124, 598; in Wales, 123; phenology of, 123, 125, 559; spray warnings against, in Holland, 96, 123; studies on, 71, 598; varietal susceptibility to, 71, 94, 559, 598, 670.
— — on *Solanum antipoviczii* in Mexico, 672.
— — on *Solanum verrucosum* in Mexico, 397.
— — on tomato, control, 78, 125, 625, 753; factors affecting, 78; losses caused by, 124; occurrence in the Channel Islands, 494; in Esthonia, 25; in Guatemala, 431; in Jamaica, 625; in New S. Wales, 753; in U.S.A., (?) 78, 124; phenology of, 125; study on, 78.
[*Phytophthora*] *megasperma* on hollyhock in U.S.A., 803.
— *nicotianae*, see *P. parasitica nicotianae*.
— *omnivora*, heterothallism in, 205.
— *palmivora*, effect of dyes on growth of, 206.
— (?) — on *Aleurites fordii* in India, 509.
— — on cacao, control, 26, 703; effect of, on yield, 431; factors affecting, 698, 701, 702, 703; occurrence in the Gold Coast, 701, 702, 703; in Guatemala, 431; in St. Lucia, 26, 698; in Trinidad, 283; studies on, 701, 702, 703; viability of, in soil, 703.
— — on coco-nut, notes on, 27, 41; occurrence (?) in St. Lucia, 27; production of oospores in paired cultures of, 206.
— — on *Hevea* rubber in Ceylon, 401; in Java, 600.
— — on Palmyra palm, production of oospores in paired cultures of, 206.
— *parasitica*, effect of dyes on growth of, 206.
— (?) — on *Cotyledon* in S. Africa, 331.
— — on *Cyphomandra betacea* in the Gold Coast, 696.
— — on *Lupinus luteus* in Italy, 766.
— — on orange in Uruguay, 226.
— — on pineapple in Jamaica, 625.
— — on *Piper betle* in India, 426.
— —, production of oospores in paired cultures of, 206.
— — *macrospora* on tobacco in France, 23.
— — *nicotianae* on tobacco, breeding against, 407, 806; control, 333, 677, 750; occurrence in Guatemala, 431; in Java, 333, 750; in Porto Rico, 677; in Rumania, 156; in Sumatra, 333; in U.S.A., 407, 806; studies on, 407, 750; varietal resistance to, 408.
— — *rhei* on rhubarb in S. Africa, 331.
— *porri* on leeks in England and Scotland, 151.
— *syringae* on apple in England, 111.
— — on lilac in Europe, 579.
— — on pear in England, 111.
Picea, see Spruce.
Pictyogenes curvidens, *Trichoderma nunbergii* in the feeding galleries of, in conifers in Silesia, 757.
Pieris brassicae, *Entomophthora sphaerosperma* on, in Poland, 456.
Pigeon pea (*Cajanus indicus*), *Cercospora* on, in India, 425.
— —, *Colletotrichum cajani* on, in India, 425; *Glomerella cingulata* ascigerous stage of, 425.
— —, *Fusarium vasinfectum* on, in India, 424, 426.
— —, *Nematospora coryli* on, in Tanganyika, 698.
— —, *Thaeolus manihotis* on, in Madagascar, 492.
— —, *Pythium splendens* var. *hawaiianum* on, in Hawaii, 546.

[Pigeon pea], 'sterility' of, in India, 425, 427.
Pimpinella anisum, see Anise.
Pine (*Pinus*), Basidiomycetes on, forming mycorrhiza in U.S.A., 527.
—, *Brunchorstia destruens* on, see *Crumenula abietina* on.
—, *Ceratostomella ips* on, in U.S.A., 341.
—, — *pini* on, in U.S.A., 340.
—, chlorosis of, in England, 326.
—, *Clitocybe diatreta* and *C. rivulosa* var. *angustifolia* on, forming mycorrhiza in U.S.A., 527.
—, *Cronartium comptoniae* on, in Canada and U.S.A., 615.
—, — *ribicola* on, legislation against, in U.S.A., 208; losses caused by, 142; occurrence in Canada, 553; in Germany, 81; in Norway, 136; in U.S.A., 142, 143, 161, 208, 276, 486; *Ribes* eradication against, in Canada, 553; in U.S.A., 142, 143, 161, 276, 486; specific susceptibility to, 81.
—, *Crumenula abietina* on, in Denmark and Great Britain, 757.
—, — *pinicola* on, in Norway, 136.
—, damping-off of, control, 496.
—, *Dasyscypha fuscosanguinea*, *D. resinaria*, and *D. subtilissima* on, in Norway, 136.
— eradication against *Cronartium ribicola* on currants in Norway, 136.
—, *Fomes annosus* on, in Germany, *Oedocephalum* in relation to, 82, 145.
—, — *laricis* on, in Canada, 614.
—, — *pinicola* on, in Japan, 614.
—, *Hypodermella sulcigena* on, in Finland, 486.
—, *Lophodermium pinastri* on, in Finland, 486; in Norway, 136; *Leptostroma pinastri* conidial stage of, 486.
—, *Lycoperdon gemmatum* on, forming mycorrhiza in U.S.A., 527.
—, *Oedocephalum* on, in Germany, *Fomes annosus* in relation to, 82, 145.
—, *Peridermium pini* on, in Finland, 486.
—, *Pestalozzia funerea* on, in U.S.A., 377, 413; *Monochaetia*-like variants of, 413.
—, *Phacidium infestans* on, in Finland, 486; in Norway, 136.
—, *Polyporus ellisianus* on, in Canada, 615.
—, — *orientalis* on, in Japan, 614.
—, — *schweinitzii* and *P. sulphureus* on, in Japan, 614.
—, *Septoria acicola* on, in U.S.A., 813.
—, *Trametes pini* on, in N. America, 614; in U.S.A., 214.
—, *Tricholoma personatum* on, forming mycorrhiza in U.S.A., 527.
Pineapple (*Ananas sativus*), *Ceratostomella paradoxa* on, control, 192; legislation against, in the Argentine, 415; in Spain, 752; losses caused by, 192; occurrence in Australia, 192, 252; study on, 192.
—, *Fusarium* on, legislation against, in Spain, 752.
—, *Nematosporangium aphanidermatum*, *N. arrhenomanes*, *N. epiphanosporon*, *N. hyphalosticton*, *N. leiohyphon*, *N. leucosticton*, *N. polyandron*, *N. rhizophthoron*, *N. spaniogamon*, and *N. thysanohyphalon* on, taxonomy of, 129.
[Pineapple], *Phytophthora parasitica* on, in Jamaica, 625.
—, *Pythium acanthophoron*, *P. artotrogus* var. *macracanthum*, *P. diameson*, *P. euthyhyphon*, *P. irregulare* var. *hawaiiense*, *P. polymorphon*, and *P. splendens* var. *hawaiianum* on, in Hawaii, 546.
— wilt in Hawaii, 191.
— yellow spot in Hawaii, 78, 116, 191, 218, 586; relation of, to *Crotalaria* mosaic, 116; to pea streak, 218; studies on, 116, 191, 586; transmission of, by *Thrips tabaci*, 78, 116, 191, 586; from *Crotalaria*, 116; to *Bidens pilosa*, *Emilia flammea*, *Senecio hieracifolia*, and *Sonchus oleraceus*, 586.
'Pin-head' black spot of banana in Jamaica, 625.
Pinus, see Pine.
Pionnotes rhizophila, see *Fusarium merismoides* var. *majus*.
Piper betle, *Corticium solani* on, in India, 426.
— —, *Phytophthora* on, in India, 158, 283.
— —, — *colocasiae* on, in Malaya, 769.
— —, — *parasitica* on, in India, 426.
— —, *Rhizoctonia* on, in India, 158.
— —, *Sclerotium rolfsii* on, in India, 158, 283.
Piricularia grisea on banana in Brazil, 728.
— *oryzae*, action of, on cellulose, 800.
— —, method of testing viability of conidia of, 400.
— — on rice, factors affecting, 536, 538, 800, 801; nature of resistance to, 1; occurrence in India, 223; in Japan, 1, 536, 538, 800; in Russian Central Asia, 315; physiologic specialization in, 538; studies on, 538; varietal resistance to, 1.
Pisum, see Peas.
Pitting of grapefruit in U.S.A., 570.
Pityrosporum, *Cryptococcus* (*pro parte*) synonym of, 642.
Plane tree, see *Platanus*.
Plant disease control in Holland, 315.
— — resistance, 197.
— diseases, bibliography of, for 1931, 665.
— —, French treatise on, 525.
— —, German books on, of ornamentals, 245, 649.
— — in Canada, 96, 495, 695; in Egypt, 224; in Germany, 693; in Latvia, 768; in Rumania, 156; in Scotland, 222; in Southern Rhodesia, 25, 746; in Sicily, 495; in Tanganyika, 474; in U.S.A., 97, 627, 770.
— —, losses caused by, in Germany, 66; in U.S.A., 769.
— —, need for the study of, in French colonies, 590.
— —, new edition of Sorauer's handbook of, 526.
— —, pathogenesis in, 65.
— —, Russian booklet on bacterial, 29.

[Plant diseases, Russian] text-book on (fruits and vegetables), 255.
— —, standardization of common names of, 386.
— pathology, see Phytopathology.
— protection, cultural methods in relation to, 734.
— —, scientific principles of, Russian edition of Martin's book on, 586.
— — services in Belgium, Czecho-Slovakia, Germany, Great Britain, Holland, and U.S.A., 527 ; in Italian Somaliland, 480.
— protectives, legislation regulating sale of, in Morocco, 144.
Plantago major, mildew on, *Cicinnobolus cesatii* parasitizing, in U.S.A., 377.
— —, virus of, affecting tobacco in U.S.A., 7.
Plantain (*Musa paradisiaca*), bacterial rot of, in Ceylon, 223.
—, (?) *Bacterium solanacearum* on, in Ceylon, 223.
—, *Fusarium oxysporum cubense* on, in India, 224.
—, *Marasmius stenophyllus* on, in Sierra Leone, 97.
Plantasan, use of, against *Bacterium tumefaciens* on *Salix americana*, 274.
Plasmodiophora on tobacco may be an amoeba, 796.
— *brassicae* can infect *Camelina sativa*, rape, and turnip, 16.
— — on cabbage, control, 17, 357, 686 ; occurrence in Alaska, 357 ; in England, 17, 686 ; in Germany, 16, 559 ; in Ireland, 17 ; in Scotland, 17.
— — on cauliflower, control, 17 ; occurrence in Alaska, 357 ; in the British Isles, 17 ; in Germany, 16.
— — on crucifers, control, 146, 415, 555, 686 ; factors affecting, 16 ; occurrence in England, 146, 686 ; in Germany, 16, 490 ; in New Zealand, 415, 555 ; study on, 16.
— — on kohlrabi in Germany, 16, 490.
— — on mustard in Germany, 490.
— — on radish in Germany, 16, 490.
— — on *Raphanus oleiferus* in Germany, 16.
— — on swedes in Canada, 276 ; in Scotland, 759.
— — on turnip, control, 623 ; factors affecting, 623 ; occurrence in Canada, 276 ; in England, 623 ; in Scotland, 759 ; varietal resistance to, 276, 759.
— —, specialization in, 16, 277, 490.
— *solani* in relation to virus diseases of potato, 394.
Plasmopara nivea on anise in Russia, 73.
— *viticola* on vine, control, 24, 153, 154, 221, 351, 422, 622, 663, 664, 692, 693, 764 ; factors affecting, 24, 155, 221, 351, 422, 495, 622, 692, 799 ; forecasting of outbreaks of, 622, 692, 764 ; nature of resistance to, 155, 351, 507 ; notes on, 94, 220, 622 ; occurrence in France, 94, 153, 154, 155, 220, 221, 351, 422, 507, 622, 663, 664, 693, 764 ; in Germany, 495, 764, 799 ; in India, 622 ; in Italy, 692 ; in Russia, 93 ; in Switzerland, 24, 692 ; in Tunis, 153, 351 ; in U.S.A., 693 ; phenology of, 93, 351, 422, 622, 692, 764 ; sap concentration in relation to, 155, 351 ; studies on, 155, 351 ; susceptibility of self-rooted vine hybrids to, 154 ; *Trichothecium plasmoparae* parasitizing, in France and U.S.A., 693 ; varietal resistance to, 154, 764.
Platanus, *Nummularia regia* on, in Spain, 611.
—, *Polyporus* (*Fomes*) *connatus* on, in Norway, 137.
'Platz' motor spraying apparatus, 196.
Plectodiscella synonym of *Elsinoe*, 724.
— *piri* renamed *Elsinoe piri*, 724.
— *veneta* on dewberry in U.S.A., 626, 662.
— — on loganberry and raspberry in England, 61.
— — renamed *Elsinoe veneta*, 724.
Plenodomus destruens on sweet potato in U.S.A., 535.
— *meliloti* can infect *Melilotus alba*, 303.
— — on clover in Canada, 246.
— — on hollyhock in Canada, 303.
— — on lucerne and *Melilotus alba* in Canada, 246.
Pleosphaerulina sojaecola on soy-bean in Siberia, 88 ; ascigerous stage of *Phyllosticta sojaecola*, 88.
Pleospora alternariae on tobacco in Rumania, 77 ; *Alternaria tenuis* conidial stage of, 77.
— *camelliae* on *Camellia japonica* in S. Africa, 267.
— *graminea* on barley in Denmark, 162.
— *herbarum* ascigerous stage of *Macrosporium commune*, 449 ; of *M. sarcinula*, 268.
— — on lemon in Sicily, 449.
— — on lucerne and onion in S. Africa, 268.
Pleurotus mutilus in mushroom beds in Austria and Denmark, 493.
Plum (*Prunus domestica*), bacterial gummosis of, in U.S.A., 311.
—, *Clasterosporium carpophilum* on, in Uruguay, 226.
—, copper deficiency chlorosis of, in S. Africa, 724.
—, *Cytospora* on, in England, 61 ; in Holland, 767.
—, *Diaporthe perniciosa* on, in Holland, 767.
—, *Dibotryon morbosum*, legislation against, in the British Isles, 543.
—, drought spot and Kelsey spot of, in S. Africa, 521.
—, *Leucostoma persoonii* on, in England, 61 ; transmission of, from peach, 60.
— mosaic in Czecho-Slovakia, 258, 424.
—, *Pseudomonas .mors-prunorum* on, control, 379, 726 ; notes on, 584 ; occurrence in England, 379, 584, 726 ; study on, 379 ; varietal susceptibility to, 726.
—, — *prunicola* on, in England, 58 ; relation of, to allied organisms, 249, 311.

[Plum], *Puccinia pruni-spinosae* on, control, 789 ; notes on, 789 ; occurrence in Bulgaria, 745; in England, 559 ; in S. Africa, 789 ; in U.S.A., 249.
—, *Sclerotinia cinerea* on, in Spain, 307.
—, sooty blotch of, in England, 22.
—, *Stereum purpureum* on, in England, 59.
—, sun scorch of, in S. Africa, 521.
—, *Taphrina insititiae* on, in Czecho-Slovakia, 424.
—, *Verticillium albo-atrum* on, in Bulgaria, 745.
'Plume' disease of peach in Italy, 462.
P M A, use of, against *Sclerotium rolfsii* on cotton, 298.
Poa, effect of germisan on germination of, 722.
—, *Puccinia graminis* on, in S. Africa, 231.
— *annua*, *Calonectria graminicola* on, in Great Britain, 246.
— *pratensis*, *Claviceps purpurea* in seed samples of, in Denmark, 304.
— —, *Septoria tritici* on, in Bulgaria, 745.
— *trivialis*, *Claviceps purpurea* in seed samples of, in Denmark, 304.
'Pock' disease of tobacco, 'korab' disease in Sumatra identical with, 333.
Podocarpus, *Bacillus radicicola* on, in S. Africa, 258.
— *falcatus* and *P. latifolius*, *Bacillus radicicola* on, and mycorrhiza of, in S. Africa, 258, 592.
— *macrophylla*, mycorrhiza of, in Japan, 387.
Podosphaera leucotricha on apple, control, 519; factors affecting, 799; occurrence in Germany, 799; in New S. Wales, 519; in Russian Central Asia, 316.
Podosporiella on apple in U.S.A., 378.
Poeciloscytus cognatus, transmission of beet mosaic by, in the Ukraine, 90.
Poinsettia, see *Euphorbia*.
Pokkah boeng of sugar-cane, attributed to *Fusarium moniliforme* var. *majus* in Japan, 332 ; to *F. m.* var. *subglutinans* in Hawaii, 4 ; to *F.* distinct from *F. moniliforme* in the Philippines, 266, 403. (See also *Gibberella moniliformis*.)
Pole rot of curing tobacco in U.S.A., 135.
'Polvillo' disease of tobacco in the Argentine, 269.
Polypodium vulgare, *Milesina jezoensis* on, in Japan, 340.
Polyporaceae, list of, in Great Lakes region, U.S.A., 552.
Polyporus adustus, cultural characters of, 684.
— *berkeleyi* on *Abies nordmanniana* in Russia, 680.
— *betulinus* on birch in Japan, 552.
(?) — *coffeae* on coffee in Madagascar, 699.
— *connatus*, see *Fomes connatus*.
— *croceus* on chestnut in Russia, 680 ; *P. pilotae* synonym of, 680 ; *P. rutilans* distinct from, 680.
— *dryadeus* on chestnut and oak in Russia, 680.
[*Polyporus*] *ellisianus* on pine in Canada, 615.
— *fumosus*, cultural characters of, 684.
— *giganteus* on beech in Russia, 680.
— *gilvus* on chestnut in U.S.A., 275.
— *hispidus* on apple in Bulgaria, 475.
— — on timber, action of, 343.
— — on walnut in Bulgaria, 475.
— *japonicus* on oak in Japan, 812.
— *mikadoi*, morphology and wood-decaying action of, 813.
— *obtusus* on oak in U.S.A., 337 ; renamed *Trametes obtusa*, 337.
— *orientalis* on pine in Japan, 614.
— *pilotae* on chestnut in U.S.A., 275.
— — synonym of *P. croceus*, 680.
— *rutilans*, *P. croceus* not accepted as synonym of, 680.
— *schweinitzii* on *Abies* in Japan, 614.
— — on *Chamaecyparis thyoides* in U.S.A., 140.
— — on conifers in N. America, 614.
— — on larch and pine in Japan, 614.
— — on *Pseudotsuga taxifolia* in U.S.A., 615.
— — on spruce in Japan, 614.
— —, tests of timber preservatives against, 84.
— *spraguei* on chestnut in U.S.A., 275.
— *sulphureus* on *Abies* in Canada and Japan, 614.
— — on chestnut in U.S.A., 275.
— — on larch, pine, and spruce in Japan, 614.
Polyspora lini on flax in Latvia, 784.
Polystictus on timber in Germany, 343.
— *abietinus* on *Pseudotsuga taxifolia* in U.S.A., 615.
— *cinnabarinus* and *P. hirsutus* on timber in U.S.A., 275.
— *pergamenus* on chestnut in U.S.A., 275.
— *sanguineus* on timber in the Philippines, 218.
— —, use of, in tests of timber preservatives, 15.
— *versicolor* on oak in U.S.A., 497.
— — on timber, action of, 343.
— —, use of, in tests of timber preservatives, 84, 487.
Polystigma rubrum on damson in Europe and U.S.A., 660.
Polystigmella ussuriensis on *Prunus triflora* var. *coreana* in Siberia, 60 ; ascigerous stage of *Rhodoseptoria ussuriensis*, 59.
Pomelo, see Grapefruit.
Poplar (*Populus*) canker, legislation against, in Germany, 607 ; occurrence in France, 94. (See also *Micrococcus populi* on.)
—, *Cytospora* on, in Canada, 137.
—, *Didymosphaeria populina* on, in France and Italy, 137.
—, *Dothichiza populea* on, in Belgium, 338 ; in Germany, 138, 338.
—, *Fomes connatus* on, in Norway, 137.
—, *Marssonina populi* on, in Norway, 136.
—, *Micrococcus populi* on, in Italy, 612. (See also canker.)
—, *Polyporus connatus* on, see *Fomes connatus* on.

[Poplar], *Septoria* on, in Canada, 137.
—, — *populi* on, in Spain, 329.
—, *Stereum purpureum* on, in New Zealand, 247.
—, *Trametes suaveolens* on, in U.S.A., 811.
Populus deltoides, see Cottonwood.
— *tremula*, see Aspen.
Poria, key to some American species of, 552.
— on box in Russia, 681.
— on *Hevea* rubber in Indo-China, 432.
— *hypolateritia* on tea in Ceylon, 749.
— *subacida* on timber in U.S.A., 552.
— *vaporaria* on timber, control, 83, 84; occurrence in England, 274; in Germany, 84; in Russia, 83.
— —, toxicity of fatty acids to, 816; of thanalith U to, 85; of various timber preservatives to, 15, 84.
(?)— *weirii* on *Chamaecyparis thyoides* in U.S.A., 140.
— — on *Thuja plicata* (?) in Canada, 615; in U.S.A., 140.
Potash deficiency in cotton in U.S.A., 160, 638.
— — in relation to leaf scorch of currants in Germany, 463; of fruit trees in Victoria, 56; to leaf spotting of apple in Tasmania, 114; to white spots on clover in Denmark, 768.
—, see also Fertilizers.
— fish oil soap, use of, as emulsifier, 519.
Potassium bichromate, adhesiveness of, to seed, 441, 586.
— —, use of, against *Pleospora alternariae* on tobacco, 77; as a timber preservative, 217.
— carbonate, use of, against *Gloeodes pomigena* on orange, 105.
— permanganate, use of, against *Alternaria dianthi* on carnation, 497; against *Cercospora kopkei* on sugar-cane, 205; against *Erysiphe polygoni* on melon, 94; against mushroom diseases, 493; against psorosis of orange, 367; against *Uncinula necator* on vine, 221, 693.
— polysulphide, fungicidal properties of, 732.
Potato (*Solanum tuberosum*) acronecroses in England, 741; relation of, to 'healthy potato' virus and to a tomato virus disease, 808; synonymy of, 741; types of, 741.
— acropetal necrosis, histological effects of, 741; relation of *y* virus to, 741; stipple streak and leaf drop streak synonyms of, 740.
—, *Actinomyces flavus* on, in England, 200.
—, — *scabies* on, control, 123, 259, 321, 355, 397, 597, 626, 671; effect of, on acidity of the tuber, 122; factors affecting, 26, 597, 626, 668; histogeny of, 200; legislation against, in Portugal, 272; nature of resistance to, 69; occurrence in Canada, 259; in England, 122, 200; in Germany, 69, 320, 533, 559, 597; in Jamaica, 26; in Norway, 670; in S. Africa, 123; in U.S.A., 355, 532, 626, 668, 671; in Western Australia, 397; studies on, 69, 200; varietal susceptibility to, 69, 320, 533.
[Potato], *Aecidium cantensis* on, in Peru, 226.
—, *Alternaria solani* on, control, 67, 125, 159, 397; occurrence in Cyprus, 670; in India, 159; in Jamaica, 26, 397; in Kenya, 67; in Rhodesia, 67; in S. Africa, 125; in Uganda, 353.
—, aucuba mosaic of, cytology of, 532; note on, 256; occurrence in Belgium, 121; in Ireland, 532; transmission of, by true seed, 200.
—, *Bacillus* (?) *aroideae* can infect, 209.
—, — *carotovorus* on, in Norway, 670.
—, — *phytophthorus* on, control, 259; effect of, on acidity of the tuber, 122; on sprouting, 261; losses caused by, 258; occurrence in Canada, 258; in Czecho-Slovakia, 261; in England, 122; in Germany, 65, 559; in U.S.A., 258; *Phorbia cilicrura* in relation to, 259; study on, 258; synonymy of, 259; transmission of, 259. (See also *B. carotovorus* on.)
—, bacterial rot of, in India, 126; legislation against, in Portugal, 272.
—, *Bacterium* on, in Rhodesia, 67.
—, (?)— *aptatum* on, in England, 701.
—, — *rubefaciens* on, in England, 122, 320. (See also sprain of.)
—, — *sepedonicum* on, in U.S.A., 670.
—, — *solanacearum* on, in Porto Rico, 29; in S. Africa, 122.
—, black heart of, in Alaska, 357; in India, 126.
—, *Botrytis cinerea* on, in Hungary, 222; in Norway, 670.
—, calico of, in U.S.A., 320, 667.
—, *Colletotrichum atramentarium* on, in England, 144, 202, 323; relation of, to potato sickness, 144, 202, 323.
—, *Corticium solani* on, control, 125, 259, 260, 322, 355, 397, 534, 626, 671, 800; factors affecting, 125, 201, 259, 468; occurrence in Canada, 259, 468; in England, 144, 323; in France, 260; in Germany, 65; in Kenya, 67; in New Zealand, 201, 260, 534; in Norway, 670; in Peru, 226; in Rhodesia, 67; in Scotland, 323; in S. Africa, 125; in U.S.A., 355, 469, 532, 626, 671; in Western Australia, 397; physiology of, 468; relation of, to potato sickness of soil, 144, 202, 323; spread of, 201; strains of, 469; studies on, 201, 468, 534; varietal susceptibility to, 226.
—, cracking of tubers of, in U.S.A., 668.
— crinkle, complex nature of, 394, 738, 739; cytology of, 532; effect of, on acidity of the tubers, 122; note on, 319; occurrence in England, 122, 394; in Ireland, 532, 789; in Kenya, 67; in Portugal, 68; in Rhodesia, 67; in Wales, 319; relation of, to potato

mosaic, 256, 739; to potato streak, 740; to potato sub-crinkle, 740; to potato virus disease A, 740; of *y* virus to, 394, 738; transmission of, by ultra-filtered virus, 256. (See also para-crinkle of.)
[Potato crinkle] A, complex nature of, 594, 739; occurrence in England, 594.
—, curly dwarf of, in Kenya, 67.
— degeneration, ecological factors in, 395, 531; occurrence in Austria, 743; in Germany, 65, 395, 531; in Portugal, 68; osmotic capacity in relation to, 743; study on, 395. (See also virus diseases of.)
—, *Didymella lycopersici* can infect, 809.
— diseases in Canada, 96; in U.S.A., 467; losses caused by, in Germany, 66; in U.S.A., 770; spray warnings against, in U.S.A., 729.
—, filosité of, in Portugal, 68.
—, *Fusarium* on, legislation against, in Portugal, 272; occurrence in India, 126; in Kenya, 67.
—, — *coeruleum* on, in Norway, 669.
—, — *culmorum* on, in Rhodesia, 67.
—, — *martii* var. *minus* on, in Peru, 226.
—, — *solani* on, in Peru, 226; in Rhodesia, 67.
—, — (?) — var. *minus* on, in Cyprus, 695.
—, giant hill of, in U.S.A., 667.
—, 'healthy potato virus' of, in U.S.A., 271, 595; relation of, to potato mosaic, 595, 596, 739; to potato streak, 739; to tobacco leaf necrosis, 596; to tobacco necrotic mosaic, 271; to tobacco spot necrosis, 595; to tomato spot necrosis, 595; to tomato streak, 271, 596; viability of virus of, 596.
—, heart necrosis of, in Germany, 534.
—, heat rot of, see black heart of.
—, hereditary sprain of, in Italy, 199.
—, *Heterodera schachtii* on, in relation to potato sickness, in Great Britain, 144, 202, 323.
—, hollow heart of, in Germany, 535.
—, internal brown or rust spot of, see sprain of.
—, kringerigheid of, distinct from hereditary sprain, 199.
— leaf curl in India, 781.
— leaf roll, control, 667, 800; cytology of, 532; effect of, on acidity of tubers, 122; on assimilation, 467; on respiration, 319; on sprouting, 261; on yield, 23, 120, 319; factors affecting, 120, 261, 319, 429; histological effects of, 741; monograph on, 668; nature of virus of, 668; notes on, 596; occurrence in Belgium, 121; in Czecho-Slovakia, 68, 261; in Denmark, 467; in England, 122; in France, 23, 261; in Germany, 668; in Ireland, 532; in Kenya, 67; in New Zealand, 394; in Portugal, 68; in Scotland, 68; in Switzerland, 120; in U.S.A., 429, 531, 596, 667; in Wales, 200, 318, 319; studies on, 318, 319, 532; transmission of, by core grafts, 667; by *Empoasca fabae* and (?) *Epitrix cucumeris*, 531; by *Macrosiphum gei*, 200, (?) 394, 531, 667; by *M. pelargonii*, 667; by *Myzus circumflexus*, 200, 667; by *M. persicae*, 68, 200, 394, 531, 667; by true seed, 200; types of, 668; varietal resistance to, 23, 318.
[Potato], *Macrophomina phaseoli* on, in India, 126.
—, 'maladie des tâches en couronne' of, distinct from hereditary sprain, 199.
— mosaic, bio-chemistry of, 200; control, 667, 767; cytology of, 532; effect of, on acidity of the tuber, 122; on sprouting, 261; on yield, 120, 319, 667; factors affecting, 120, 319, 429; occurrence in Belgium, 121; in Canada, 258; in Czecho-Slovakia, 68, 261; in England, 122, 394; in Germany, 121, 256; in Holland, 767; in Ireland, 532, 739; in Kenya, 67; in Peru, 226; in Portugal, 68; in Scotland, 68; in Switzerland, 120; in U.S.A., 200, 429, 595, 667; in Wales, 319; pathological effects of, 121; relation of, to 'healthy potato' virus, 595, 596; to potato crinkle, 256, 739; to potato crinkle A, 739; to tobacco mosaic, 595; to tobacco veinbanding, 595, 596; of *x* virus to, 394, 594; of *y* virus to, 394, 594, 738; of *z* virus to, 594; studies on, 121, 200, 318, 667; transmission of, by core-grafts, leaf mutilation, *Macrosiphum gei*, *M. pelargonii*, and *Myzus circumflexus*, 667; by *M. persicae*, 68, 667; by ultra-filtered virus, 256; types of, 256, 532, 594, 595, 596, 667; use of immature seed against, 767; varietal susceptibility to, 318.
— mottling in Belgium, 121.
—, *Mucor abundans* can infect, 554.
—, net necrosis of, in Holland, 766.
—, *Oidium* on, in Peru, 226.
—, *Oospora pustulans* on, in U.S.A., 670.
—, para-crinkle of, in England, 594; *y* or *y'z* viruses as constituents of, 594.
—, Pfropfenbildung of, distinct from hereditary sprain, 199.
—, *Phomopsis tuberivora* on, in Canada, 671.
—, physiological blackening of, in England, 93.
—, *Phytophthora infestans* on, breeding against, 598, 667; control, 125, 322, 396, 397, 494, 670, 766, 769; effect of, on acidity of tubers, 122; factors affecting, 71; legislation against, in Portugal, 272; losses caused by, 66, 124, 598; notes on, 225, 766; occurrence in Austria, 71, 322; in the Channel Islands, 493; in Cyprus, 670; in England, 94, 122, 123, 559, 598; in Germany, 65, 66, 559, 667; in Guatemala, 431; in Holland, 96, 766; in Ireland, 396; in Jamaica, 397; in Malta, 769; in Norway, 669, 670; in Peru, 225; in Tasmania, 322; in U.S.A., 124, 598; in Wales, 123;

phenology of, 123, 125, 559; spray warnings against, in Holland, 96, 123; studies on, 71, 598; varietal susceptibility to, 71, 94, 559, 598, 670.
[Potato], *Plasmodiophora solani* in relation to virus diseases of, 394.
—, premature sprouting of, in India, 126.
—, *Puccinia pittieriana* on, in Peru, 226.
—, *Pythium aphanidermatum* on, in S. Africa, 331.
—, *Sclerotinia fuckeliana* on, in Hungary, 222.
—, — *sclerotiorum* on, in Norway, 670; in Russia, 652.
—, *Sclerotium rolfsii* on, control, 547; *Corticium rolfsii* perfect stage of, 748, 749; occurrence in Italy, 406, 746, 748; in Jamaica, 26, 547; in U.S.A., 349; studies on, 406, 746, 748.
— seed certification in Canada, 258, 532, 533; in Germany, 65, 597; in U.S.A., 532; in Western Australia, 397.
— sickness of soil in Great Britain, 144, 202, 323; *Colletotrichum atramentarium*, *Corticium solani*, and *Heterodera schachtii* in relation to, 144, 202, 323.
— spindle tuber, control, 667; effect of, on yield, 667; histological effects of, 742; notes on, 596; occurrence in U.S.A., 596, 667, 742; transmission of, by core-grafts and leaf mutilation, 667.
—, *Spondylocladium atrovirens* on, in U.S.A., 670.
—, *Spongospora subterranea* on, effect of, on acidity of the tuber, 122; legislation against, in Brazil, 415; in Esthonia, 24; in Portugal, 272; note on, 226; occurrence in England, 122; in Kenya, 67; in Norway, 670; in Peru, 226.
— sprain in Norway, 670; in Rhodesia, 67; in Russia, 670; internal brown spot and analogous conditions regarded as distinct from hereditary type of, 199. (See also *Bacterium rubefaciens* on.)
—, stipple streak of, see streak of.
— streak, complex nature of, 394, 738; cytology of, 532; of infective *Myzus persicae*, 68; occurrence in Belgium, 121; in Czecho-Slovakia, 68; in England, 394; in Ireland, 532; in Kenya, 67; in Portugal, 68; in Rhodesia, 67; relation of, to potato crinkle, 740; to potato mosaic, 738; to tomato streak, 271; of *x* virus to, 394; of *y* virus to, 394, 738; of *z* virus to, 738; studies on, 394, 532; synonymy of, 740.
— sub-crinkle in Ireland, 740.
—, *Synchytrium endobioticum* on, control, 71, 321, 468; cytology of, 123, 261; effect of, on acidity of the tuber, 122; on yield, 322; factors affecting, 70; genetics of resistance to, 669; legislation against, in Brazil, 415; in the British Isles, 543; in Dutch E. Indies, 608; in Esthonia, 24; in Germany, 597; in Jugo-Slavia, 272; in Portugal, 272; in Spain, 752; method of testing immunity from, 70, 744; monograph on, 321; notes on, 70, 71, 495; occurrence in Austria, 321; in Belgium, 123; in Denmark, 768; in England, 122, 321; in Germany, 65, 69, 70, 261, 321, 597; in Norway, 669; in Peru, 226; in Poland, 743; not in Russia, 70; in Sweden, 533; in Switzerland, 120, 468, 495; studies on, 69, 261, 321, 533, 669; varietal resistance to, 69, 71, 120, 468, 533, 669, 743.
[Potato], tobacco veinbanding virus affecting, in U.S.A., 595.
— top necroses A, B, C, and X, see acronecroses.
—, *Verticillium albo-atrum* on, in Norway, 670.
—, — *dahliae* can infect, 550.
— virus disease A in Ireland, 740; relation of, to potato crinkle, 740.
— virus diseases, complex nature of, 394, 738; control, 68, 122, 395; effect of, on yield, 597; factors affecting, 120, 121, 531; maintenance of stock free from, 596; notes on, 68; occurrence in Belgium, 121, 800; in England, 596; in Germany, 65, 121, 531; in Holland, 96, 800; in New S. Wales, 395; in Portugal, 68; in Scotland, 68; in Switzerland, 120; in Tasmania, 122; in Victoria, 395; pathological effects of, 68, 121; transmission of, by true seed, 199; varietal susceptibility to, 68, 120. (See also degeneration of.)
— viruses *x*, *y*, and *z*, 394, 594, 738, 741.
—, witches' broom of, in U.S.A., 596. 667.
—, yellow dwarf of, in U.S.A., 743.
Powell's solution, composition of, and use of, as a wood preservative, 146.
Preparation No. 1, use of, against *Calonectria graminicola* on rye, 777.
— No. 664 dust, use of, against *Sclerotium rolfsii* on cotton, 298.
Preparations Nos. 1389, 1390, 1391, 1392, and 1393, use of, against *Cercospora beticola* on beet, 348.
Primula denticulata and *P. obconica*, mosaic of, in Japan, 797.
Proactinomyces, separation of the genus, from *Actinomyces*, 602.
Promecotheca cumingii in relation to *Epicoccum cocos* and *Pestalozzia palmarum* on coco-nut in the Philippines, 780.
Protomyces macrosporus on coriander in Russia, 73.
Prune, see Plum.
Prunus, *Puccinia pruni-spinosae* on, in Bulgaria, 745.
— *amygdalus*, see Almond.
— *armeniaca*, see Apricot.
— *avium* and *P. cerasus*, see Cherry.
— *domestica*, see Plum.
— *insititia*, see Damson.
— *japonica*, virus disease of, in U.S.A., 7; transmitted to peach, 7.

[*Prunus*] *mume*, *Cercospora circumscissa* on, in Japan, 789.
— —, *Ganoderma applanatum* on, in Japan, 11.
— —, *Valsa japonica* can infect, 60.
— *padus*, *Thecopsora areolata* on, in France, 340.
— *persica*, see Nectarine, Peach.
— *triflora* var. *coreana*, *Polystigmella ussuriensis* on, in Siberia, 60; *Rhodoseptoria ussuriensis* ascigerous stage of, 59.
Psalliota arvensis and *P. campestris*, see Mushrooms.
Pseudobalsamia microspora in mushroom beds, 493.
Pseudococcidioides mazzai synonym of *Coccidioides immitis*, 782.
Pseudococcus brevipes, transmission of pineapple wilt by, in Hawaii, 191.
Pseudomonas on lettuce in Czecho-Slovakia, 424.
— *campestris*, carbohydrate fermentation by, 772.
— —, cross agglutination of, with *Bacterium malvacearum*, 176.
— — on cabbage in Bermuda, 97; in Germany, 687.
— — on crucifers in Bermuda, 97.
— — on *Matthiola incana* var. *annua* in Germany and U.S.A., 517.
— *cerasi*, relationship of *P. prunicola* to, 249, 311.
— *citri* on citrus, control, 752; legislation against, in the Argentine, 415; in U.S.A., 752.
— *citriputeale*, similarity of *P. prunicola* to, 249.
— *hyacinthi* on hyacinth in Denmark, 460.
— *itoana* on rice in Japan, 536.
— *maculicola*, see *Bacterium maculicola*.
— *melophthora* on apple in U.S.A., 657; *Rhagoletis pomonella* in relation to, 657.
— *mors-prunorum* on cherry, damson, and peach in England, 726.
— — on plum, control, 379, 726; early records of, 584; occurrence in England, 379, 584, 726; study on, 379; varietal susceptibility to, 726.
(?) — *pisi* on *Medicago lupulina* in England, 701.
— — on peas, note on, 475; occurrence in Bulgaria, 475; in Hungary and New S. Wales, 222.
— *prunicola* can infect cherry, 311; lemon, 249; plum, 311.
— — on plum in England, 58.
— —, relationship of, to *P. cerasi*, 249, 311; to *P. citriputeale* and *P. syringae*, 249.
— *savastanoi* var. *fraxini* on ash, (?) 12; in Austria, 682.
— — var. *nerii* on oleander in Tanganyika, 698.
(?) — *seminum* can infect peas, 555.
(?) — — on bean in England and France, 555.
— *syringae*, similarity of *P. prunicola* to, 249.
— *tolaasii* on mushrooms, 493.
[*Pseudomonas*] *utiformica* can infect bean, beet, cherry, cowpea, lilac, pear, and *Pueraria hirsuta*, 379.
Pseudoperonospora cubensis on cantaloupe in U.S.A., 28, 430.
— — on cucumber, control, 421; notes on, 496; occurrence in Czecho-Slovakia, 157; in U.S.A., 421, 496.
— — on melon in S. Africa, 268.
— *humuli* can infect nettles, 602.
— — on hops, control, 464, 471, 602; legislation against, in the British Isles, 543; method of obtaining oospores of, 402; notes on, 471; occurrence in Canada, 402, 602; in Czecho-Slovakia, 472; in England, 94, 464, 471, 602, 744; varietal resistance to, 94, 471, 472.
Pseudopeziza ribis on currants in Germany, 799.
Pseudotsuga taxifolia, *Armillaria mellea* on, in Germany, 141.
— —, *Botrytis* and *Corticium solani* on, in Ireland, 413.
— —, *Dasyscypha resinaria* on, in Norway, 136.
— —, *Fomes annosus* on, in Germany, 141; in U.S.A., 615.
— —, — *laricis* on, in Canada, 614; in U.S.A., 615.
— —, — *roseus* on, in Canada and U.S.A., 615.
— —, *Ganoderma oregonense* on, in N. America, 615.
— —, *Polyporus schweinitzii* and *Polystictus abietinus* on, in U.S.A., 615.
— —, *Rhabdocline pseudotsugae* on, control, 141, 142; leaf fall in relation to, 82; legislation against, in France and Germany, 215; notes on, 215; occurrence in Germany, 141, 142; in Holland, 96; in Scotland, 82; in U.S.A., 429; studies on, 82, 141; varietal susceptibility to, 141, 215.
— —, *Trametes pini* on, in N. America, 614; in U.S.A., 615.
Psidium guajava, see Guava.
Psilocybe agrariella var. *vaccinii* on cranberry in U.S.A., 188.
Psorosis of grapefruit, control, 770; etiology of, 365; occurrence in U.S.A., 365, 366, 770.
— of orange, control, 367, 770; etiology of, 365; factors affecting, 366; occurrence in U.S.A., 365, 366, 367, 770; studies on, 366, 367; varietal susceptibility to, 366.
Pteridium aquilinum, *Corticium solani* on, in U.S.A., 661.
— —, *Mycosphaerella* and *Rhopographus filicinus* on, in Scotland, 215.
Pterocarpus, *Ganoderma pseudoferreum* on, in Malaya, 402.
Pthia picta transmitting *Bacillus* (?) *aroideae* on tomato in Trinidad, 610.
Puccinia on cereals, epidemiology of, in Russia, 286.
— on rye in Russia, 628.
— on wheat in Russia, 628; in Tunis, 436.

[*Puccinia*] *allii* on *Allium* in Switzerland, 619.
— *ammophilae* on *Ammophila arundinacea* in France, 722.
— *anomala* can infect wheat, 37.
— — on barley, artificial infection of, in resistance tests, 168; factors affecting, 31, 36, 98; occurrence in Canada, 293, 294; in Germany, 31, 36, 98; physiologic forms of, 36, 294; varietal resistance to, 37, 294.
— *arenariae* on carnation in Czecho-Slovakia, 624.
— *asparagi* on asparagus in Germany, 92.
— *asphodeli* on *Asphodelus*, 391.
— *chrysanthemi* on chrysanthemum in Germany, 785.
— *glumarum*, factors affecting germination of, 31.
— — on barley in Germany, 31.
— — on *Bromus unioloides* in the Argentine, 499.
— — on cereals, introduction of, into the Argentine, 359; occurrence in France, 22.
— — on *Hordeum jubatum* in the Argentine, 499.
— — on wheat, breeding against, 163; control, 500; epidemiology of, 564; factors affecting, 31, 98, 163, 167, 499, 630, 704; genetics of resistance to, 666; methods of inducing artificial epidemics of, 167, 564; notes on, 630; occurrence in the Argentine, 499; in Belgium, 772; in France, 22; in Germany, 31, 98, 167, 564, 666, 704; in Kenya, 163; in Peru, 225; in Rumania, 156; in Uruguay, 226, 630; specialization in, 167; varietal susceptibility to, 22, 163, 167, 499, 666, 772.
— —, toxicity of sulphur dusts to, 195.
— *graminis*, effect of ultra-violet rays on, 99, 166; of X-rays on, 99.
— —, factors affecting germination of, 31, 166.
— —, heterothallism in, 262.
— — on *Agrostis* and *Avena fatua* in S. Africa, 231.
— — on barberry, hybridization of, 437; legislation against, in U.S.A., 80, 352; occurrence in Canada, 232; in Esthonia, 24; in Germany, 31; in U.S.A., 437, 628; physiologic specialization in, 232, 437, 628; study on, 437; transmission of, from oats, rye, and wheat in S. Africa, 164; specific and varietal resistance to, 24, 352, 628.
— — on barley in Brazil, 358; in Canada, 293; in Germany, 31; in S. Africa, 164, 231; in Uruguay, 358; physiologic forms of, 231.
— — on *Bromus maximus* in S. Africa, 231.
— — on cereals in Canada, 228.
— — on *Dactylis glomerata* in S. Africa, 231.
— — on *Hordeum murinum* in S. Africa, 164, 231.
— — on oats, breeding against, 31, 170, 498; factors affecting, 164, 362, 564; genetics of resistance to, 362; germination of teleutospores of, 164; occurrence in the Argentine, 358; in Brazil, 358; in Canada, 232, 362; in Czecho-Slovakia, 157; in Germany, 31; in New S. Wales, 170; in S. Africa, 164, 231; in Tunis, 436; in Uruguay, 358; in U.S.A., 437, 498; physiologic forms of, 170, 231, 232, 362, 437; study on, 362; varietal susceptibility to, 31, 170, 231.
[*Puccinia graminis*] on *Phleum pratense*, failure of, to infect barberry, 437, 628; occurrence in N. America, 437; in S. Africa, 231; in U.S.A., 628.
— — on *Poa* in S. Africa, 231.
— — on rye, germination of teleutospores of, 164; notes on, 164; occurrence in Czecho-Slovakia, 157; in Germany, 31; in S. Africa, 164, 230; in U.S.A., 437; physiologic forms of, 231, 437; varietal resistance to, 230.
— — on wheat, artificial infection of, in resistance tests, 168; breeding against, 31, 163, 227, 439; control, 32, 286; effect of light on, 166, 563, 629; of loose smut infection on, 563; of maturity on infection by, 704; of, on yield, 32; epidemiology of, 225, 230, 436, 437; factors affecting, 98, 166, 230, 287, 563, 629, 704; genetics of resistance to, 227, 438, 439; germination of teleutospores of, 164, 230, 288; hybridization of, 229; nature of resistance to, 439, 562; occurrence in the Argentine, 499; in Brazil, 358; in Canada, 166, 227, 229, 230, 286, 287, (?)437, 438, 439, 629; in Germany, 31, 98, 704; in Kenya, 159, 163; in Mexico, 436, 437; in New Zealand, 32; in Paraguay, 358; in Peru, 225; in Rumania, 156; in S. Africa, 164, 230; in Uruguay, 358, 630, 704; in U.S.A., 436, 437, 562; physiologic forms of, 159, 227, 229, 230, 262, 287, 436, 437, 438, 629; studies on, 98, 287, 438, 439, 562, 629, 704; varietal susceptibility to, 31, 159, 163, 225, 227, 439, 629, 630.
— *helianthi*, heterothallism in, 262.
— *kuehnii* on sugar-cane in the Philippines, 203.
— *lolii*, effect of light on, 564.
— —, germination of teleutospores of, 166.
— —, heterothallism in, 262.
— — on oats, artificial infection of, in resistance tests, 168; breeding against, 498; factors affecting, 31, 98, 704; occurrence in the Argentine, 358; in Brazil, 358; in Canada, 233; in Czecho-Slovakia, 157; in Germany, 31, 98; in Paraguay, 358; in Tunis, 436; in Uruguay, 358, 704; in U.S.A., 498; physiologic forms of, 233, 498; studies on, 98, 233, 498, 704.
— — on *Rhamnus cathartica* in U.S.A., 498.
— *maydis* on maize, action of, on host

tissues, 391 ; genetics of resistance to, 170 ; occurrence in Guatemala, 431 ; in U.S.A., 170.
[*Puccinia*] *mirabilissima* on barberry in Czecho-Slovakia, England, France, Germany, and Switzerland, 581.
— *paulensis* on chilli in (?) Colombia and Guatemala, 606.
— *petroselini* on coriander in Russia, 73.
— *pimpinellae* on aniseed in Russia, 73.
— *pittieriana* on potato in Peru, 226.
— — on *Solanum demissum* in Mexico, 397, 672.
— *porri* on *Allium* in Switzerland, 619.
— — on garlic in Kenya, 159.
— *pringsheimiana*. heterothallism in, 262. (See also *P. ribesii-caricis*.)
— *pruni-spinosae* can infect almond, apricot, and nectarine, 249.
— — on anemone in England, 559 ; plum eradication against, 559.
— — on *Anemone coronaria* in U.S.A., 249.
— — on *Anemone ranunculoides* in Bulgaria, 745.
— — on peach in New S. Wales, 186 ; in U.S.A., 249.
— — on plum, control, 789 ; notes on, 789 ; occurrence in Bulgaria, 745 ; in England, 559 ; in S. Africa, 789 ; in U.S.A., 249.
— — on *Prunus* in Bulgaria, 745.
— *ribesii-caricis* on gooseberry in Esthonia, 24. (See also *P. pringsheimiana*.)
— *secalina* on *Anchusa officinalis* in Bulgaria, 475.
— — on rye, factors affecting, 98 ; note on, 31 ; occurrence in the Argentine, 358 ; in Brazil, 358 ; in Czecho-Slovakia, 157 ; in Germany, 31, 98 ; in Paraguay, 358 ; in Uruguay, 358 ; study on, 98.
— *tetragoniae* on *Tetragonia expansa* in S. Africa, 268.
— *triticina* can infect *Thalictrum dipterocarpon* and *T. flavum*, 629.
— —, heterothallism in, 231, 704.
— — on wheat, artificial infection of, in resistance tests, 168 ; breeding against, 163 ; control, 32, 286, 440 ; by dusting, 196 ; differential varieties for forms of, 288 ; effect of, on chemical composition of host, 440 ; on yield, 32, 440 ; factors affecting, 32, 98, 166, 231, 629, 704 ; germination of teleutospores of, 166, 629 ; of uredospores of, 32 ; method of infection by, 440 ; note on, 31 ; occurrence in the Argentine, 358, 499 ; in Austria, 288 ; in Brazil, 359 ; in Bulgaria, 33, 288, 359 ; in Canada, 229, 286 ; in France, 22 ; in Germany, 31, 98, 231, 288, 564, 704 ; in Holland and Hungary, 288 ; in Italy, 196 ; in Kenya, 163 ; in New S. Wales, 629 ; in New Zealand, 32 ; in Paraguay, 358 ; in Rumania, 156 ; in Russia, 282 ; in Uruguay, 358, 630, 704 ; in U.S.A., 440 ; overwintering of, 229 ; physiologic forms of, 33, 231, 288, 359, 629 ; studies on, 98, 288, 359, 704 ; varietal resistance to, 22, 231, 282, 359, 440, 630.
Puccinia strum chamaenerii on *Abies* and *Epilobium angustifolium* in France, 339.
Pueraria hirsuta, *Pseudomonas utiformica* can infect, 379.
— *thunbergiana*, *Diplodia puerariae* on, (?) in China, 544.
Puffiness of the rind of oranges in S. Africa, 104.
Puk seed disinfection apparatus, 64.
Pullularia pullulans on cacao in the Dominican Republic, 30.
—, see also *Dematium*.
Pumpkin, see Vegetable marrow.
Pyrausta nubilalis, *Beauveria bassiana* and *B. globulifera* on, in U.S.A., 299.
— —, control of, by *Metarrhizium anisopliae*, 456, 782.
Pyrenochaeta on apple in U.S.A., 378.
Pyrilla pusana, *Hirsutella abietina* on, 179.
Pyroligneous acid as a soil disinfectant, 589.
Pyronema, antibiosis of bacteria to, 98.
Pyrus communis, see Pear.
— *malus*, see Apple.
Pythiomorpha miyabeana and *P. oryzae* on rice in Japan, 397.
Pythium can infect barley, 294 ; maize, 5 ; rye, 294.
(?) — on banana in Italian Somaliland, 765.
— on beet in Holland, 127.
— on cucumber in England, 93.
— on *Melilotus alba* in U.S.A., 429.
— on oats in Canada, 294.
— on peas in Holland, 127.
— on strawberry in Victoria, 380.
— on sugar-cane in the Philippines, 5, 203.
— on tobacco in Sumatra, 333.
— on tomato in England, 93.
— on wheat in Canada, 294 ; in Italy, 164.
—, taxonomy of, 330, 546.
— *acanthophoron* on pineapple in Hawaii, 546.
— *adhaerens* can infect algae, beet, cucumber, maize, peas, squash, and tomato, 605.
— — on *Rhizoclonium hieroglyphicum* in U.S.A., 605.
— *allantocladon* on spinach in Hawaii, 546.
— *angustatum* can infect maize, 605.
— — on *Spirogyra crassa* in U.S.A., 605.
— *aphanidermatum* on *Colocasia antiquorum* in the Gold Coast, 763.
— — on papaw in S. Africa, 330.
— — on potato in S. Africa, 331.
— — on sugar-cane in Hawaii, 4, 540.
— — on sweet potato and tobacco in S. Africa, 331.
— — on *Xanthosoma sagittifolium* in the Gold Coast, 763.
— — on zinnia in Malaya, 354.
— *araisosporon* on papaw in Hawaii, 546.
— *arrhenomanes* on maize in U.S.A., 28.
— — var. *canadensis* can infect barley, maize, oats, and rye, 435.

[*Pythium arrhenomanes* var. *canadensis*] on wheat in Canada, 434.
— — var. *philippinensis* can infect rice and sugar-cane, 778.
— — — — on maize in the Philippines, 777.
— (?) *artotrogus* on *Antirrhinum majus* in S. Africa, 331.
(?) — — on celery in England, 91.
— (?) — on *Papaver rhoeas* in S. Africa, 331.
— — var. *macracanthum* on pineapple in Hawaii, 546.
— *ascophallon* on *Ricinus communis* and spinach in Hawaii, 546.
— *butleri* on bean in U.S.A., 218.
— *chamaihyphon* on papaw in Hawaii, 546.
— *de Baryanum* on beet in Germany, 559.
— — on begonia in U.S.A., 718.
— — on *Cereus grandiflorus*, *C. marginatus*, and *C. spachianus* in Italy, 719.
(?) — — on chilli in U.S.A., 804.
— — on cucumber in Czecho-Slovakia, 157; in U.S.A., 350.
— — on tobacco in India, 158; in Porto Rico, 677.
— *diameson* on pineapple in Hawaii, 546.
— *dictyosporum* can infect cucumber, 605.
— — on *Spirogyra crassa* in U.S.A., 605.
— *euhyhyphon* on pineapple in Hawaii, 546.
— *graminicolum* can infect wheat, 435.
— *irregulare* on citrus in S. Africa, 331.
— — on papaw in S. Africa, 330.
— — var. *hawaiiense* on pineapple in Hawaii, 546.
— *megalacanthum* on flax, 182; in Holland, 578.
— *plerosporon* on tobacco in U.S.A., 546.
— *polycladon* on *Ricinus communis* in Hawaii, 546.
— *polymorphon* on pineapple in Hawaii, 546.
— — on tobacco in U.S.A., 546.
— *spinosum* on papaw in S. Africa, 330.
— (?) *splendens* on papaw in S. Africa, 330.
— — on *Pelargonium* in U.S.A., 650.
— — var. *hawaiianum* on bean, *Canavalia ensiformis*, cowpea, *Phaseolus aureus*, pigeon pea, pineapple, sunflower, sweet potato, and wheat in Hawaii, 546.
— *teratosporon* on spinach in Hawaii, 546.
— *ultimum* on China aster, groundnut, *Papaver nudicaule*, papaw, and rhubarb in S. Africa, 331.
— — on spinach in France, 344.
— — on *Striga lutea* and sweet potato in S. Africa, 331.
— — on tomato in U.S.A., 408.
— —, presence of callose and cellulose in hyphae of, 428.
— *volutum* on oats and wheat in Canada, 434.

Quercus, see Oak.
Quince (*Cydonia vulgaris*), *Bacillus amylovorus* on, legislation against, in Spain, 752; occurrence in U.S.A., 792.
—, *Gloeosporium album* on, in England and Wales, 423.
—, *Gymnosporangium confusum* on, in Central and Southern Europe, 145; virulence of forms on *Juniperus phoenicea* and *J. sabina* to, 145.
—, — *germinale* on, in U.S.A., 412.
—, *Neofabraea malicorticis* on, legislation against, in Spain, 752.
—, *Phyllosticta albo-maculans* on, in Spain, 329.
—, *Sclerotinia cydoniae* on, in England, 93.
Quinone, use of, against *Cladosporium fulvum* on tomato, 211.
Quinosol, use of, against *Phytophthora* on cactus, 651; against *Plasmopara viticola* on vine, 622.

Raco, use of, against *Merulius lacrymans* on timber, 217.
Radish (*Raphanus sativus*), *Bacillus aroideae* on, in Japan, 700.
—, *Cystopus candidus* on, in Czecho-Slovakia and Germany, 490.
—, *Peronospora brassicae* on, see *P. parasitica* on.
—, — *parasitica* on, in Czecho-Slovakia, 490; in Sweden, 220.
—, *Plasmodiophora brassicae* on, in Germany, 16, 490.
Radish, Chinese (*Raphanus sativus* var. *oleiferus*), *Plasmodiophora brassicae* on, in Germany, 16.
—, —, virus disease of, in the Philippines, 285.
Radium, effect of, on growth of *Collybia dryophila*, *Fusarium batatatis*, and *Macrophomina phaseoli*, 593.
—, inducement of hereditary disease in *Antirrhinum majus* by, 627.
Ragnhildiana, a new genus for intermediate *Cercospora-Cladosporium* forms, 129.
— *manihotis*, formerly determined as *Cercospora cassavae* and *C. henningsii*, 130.
Ramularia on strawberry in Canada, 251.
—, serological studies on, 798.
—, variation in, 477.
— *areola*, *Mycosphaerella areola* ascigerous stage of, 512.
— *betae* on beet in Denmark and Germany, 147.
— *cynarae* on artichoke in Bulgaria, 745.
— *macrospora* on narcissus in England, 559.
— *nigro-maculans* conidial stage of *Mycosphaerella nigro-maculans*, 188.
— *vallisumbrosae* on *Narcissus* in U.S.A., 786.
Rape (*Brassica napus*), *Phoma* (?) *lingam* on, in Holland, 95.
—, *Plasmodiophora brassicae* on, specialization in, 16.
—, *Rhizoctonia* on, in Holland, 95.

[Rape] oil, toxicity of, to *Sphaerotheca humuli*, 253.
Raphanus raphanistrum, virus disease of, in S. Africa, 427 ; transmission of, to turnip, 427.
— *sativus*, see Radish.
— — var. *oleiferus*, see Radish, Chinese.
Raspberry (*Rubus* spp.), *Bacterium tumefaciens* on, in U.S.A., 428.
—, black root of, *Botrytis cinerea* on, and (?) *Cryptosporium minimum* on, in England, 61.
—, *Didymella applanata* on, in Germany, 381 ; in Switzerland, 694.
—, *Fusarium lateritium* on, in Holland, 307.
—, *Leptosphaeria coniothyrium* and *Microthyriella rubi* on, in England, 61.
— mosaic in U.S.A., 381.
—, *Plectodiscella veneta* on, in England, 61.
— streak in U.S.A., 381.
—, *Verticillium dahliae* on, in England, 61.
— virus diseases in U.S.A., 428.
'Rebschwefler Tip-top' dusting apparatus, 205.
Reclamation disease of barley in Denmark, 767.
— — of beet, *Pythium* in relation to, in Holland, 127.
— — of cereals in Holland, 766.
— — of clover and lucerne in Denmark, 767.
— — of oats, *Aphanomyces* in relation to, 127 ; occurrence in Denmark, 767 ; in Holland, 127.
— — of peas in Holland, *Pythium* in relation to, 127.
— — of swedes and turnips in Denmark, 767.
Red plant of strawberry in Great Britain may be due to *Aphelenchus fragariae*, 380.
— stripe disease of sugar-cane in Hawaii, distinct from that due to *Phytomonas rubrilineans*, 4.
— suture disease of peach in U.S.A., 789.
Rehmiellopsis abietis on *Abies pectinata* and *A. sibirica* in Norway, 136.
Renanthera, asymbiotic germination of, in Jamaica, 388.
Resin as an adhesive, 40, 41, 158.
— soap as an adhesive, 352.
Rhabdocline pseudotsugae on *Pseudotsuga taxifolia*, control, 141, 142 ; leaf fall in relation to, 82 ; legislation against, in France and Germany, 215 ; notes on, 215 ; occurrence in Germany, 141, 142 ; in Holland, 96 ; in Scotland, 82 ; in U.S.A., 429 ; studies on, 82, 141 ; varietal susceptibility to, 141, 215.
Rhamnus cathartica, *Puccinia lolii* on, in U.S.A., 498.
Rheosporangium, transference of lobate *Pythium* species to, not accepted, 330.
Rheum, see Rhubarb.
Rhinosporidium seeberi on man in the Argentine, 515, 642 ; in India, 642 ; in U.S.A., 641 ; referred to the Chytridineae, 515.
Rhinotrichum album synonym of *Gonatorrhodiella coccorum*, 179.
Rhizidiaceae, characters of thallus in, 403.
Rhizoclonium hieroglyphicum, *Pythium adhaerens* on, in U.S.A., 605.
Rhizoctonia on carnation in U.S.A., 224.
— on coffee in India, 367.
— on *Colocasia antiquorum* in the Gold Coast, 763.
— on cucumber in U.S.A., 350.
— on lettuce in U.S.A., 589.
— on *Nothoscordum fragrans* in Italy, 529 ; resistance of *Tulipa silvestris* 'stolophyll' to, 529.
— on *Piper betle* in India, 158.
— on rape in Holland, 95.
— on strawberry in Victoria, 380.
— on wheat in Canada, 291.
— on *Xanthosoma sagittifolium* in the Gold Coast, 763.
— *bataticola*, see *Macrophomina phaseoli*.
— *gossypii* on cotton, *Corticium solani* regarded as distinct from, 454.
— *papayae*, action of, on cellulose, 800.
— *repens* on *Cattleya* forming mycorrhiza in Jamaica, 388.
— — on orchids forming mycorrhiza, 317.
Rhizoecus coffeae transmitting phloem necrosis of coffee in Brazil, 637.
Rhizophora candelaria and *R. mucronata*, *Fomes pachyphloeus* on, in the Philippines, 613.
Rhizopus, decomposition of hemicelluloses by, 263.
— on barley in Canada, 294.
— on maize in U.S.A., 778.
— on wheat in Canada, 294.
— *arrhizus* can infect bean, carrot, chilli, cucumber, eggplant, onion, squash, swede, sweet potato, and tomato, 554.
— — on cacao in the Dominican Republic, 30.
— — on vegetable marrow in U.S.A., 554.
— *fusiformis* can infect cucumber, eggplant, tomato, and other vegetables, 554.
— — on swedes in U.S.A., 554.
— *nigricans*, effect of enzymes and toxins produced by, on wheat, 389.
— — on bean in U.S.A., 554.
— — on cacao in the Dominican Republic, 30.
— — on copra in England, 175.
— — on cotton in Rhodesia, 638.
— — on *Narcissus* in U.S.A., 786.
— — on onion in U.S.A., 554.
— — on strawberry in U.S.A., 585 ; in Victoria, 380.
— — on sunflower in Russia, 282.
— — on sweet potato in U.S.A., 535.
— — on walnut in England, 80.
— (?) —, resistance of, to extreme temperatures, 318.
— — var. *minor* on sweet potato and tomato in U.S.A., 554.
— *nodosus* on eggplant in U.S.A., 554.

Rhizosphaera kalkhoffii on spruce in Norway, 136.
Rhodochytrium spilanthidis on *Ageratum conyzoides*, *Hibiscus sabdariffa*, and *Spilanthes acmella* in Sumatra, 301.
Rhododendron, *Chrysomyxa rhododendri* on, in France, 553.
— mosaic in Germany, 244.
—, *Pestalozzia* and *Phyllosticta maximi* on, in Japan, 518.
—, *Phytophthora cinnamomi* on, in U.S.A., 356, 627.
—, (?) *Venturia rhododendri* on, in Japan, 518.
— *indicum*, *Pestalozzia* (?) *guepini* on, in Germany, 650.
— *lateritium*, *Cercospora handelii* on, in Japan, 518.
— *ledifolium*, *Phyllosticta maximi* on, in Japan, 518.
— *macrosepalum*, *Rhytisma shiraiana* on, in Japan, 518; ascigerous stage of *Melasmia rhododendri*, 518.
— *obtusum*, *Cercospora handelii* on, in Japan, 518.
— —, *Phyllosticta maximi* on, in Japan, 518.
Rhodoseptoria ussuriensis imperfect stage of *Polystigmella ussuriensis*, 59.
Rhopalosiphum prunifoliae transmitting yellow dwarf of onion in U.S.A., 557.
Rhopobota vacciniana, *Entomophthora sphaerosperma* on, in U.S.A., 371.
Rhopographus filicinus on *Pteridium aquilinum* in Scotland, 215.
Rhubarb (*Rheum*), (?) beet curly top virus infecting, in U.S.A., 430.
—, *Helicobasidium purpureum* on, in Germany, 691.
—, *Macrophoma straminella* on, in Bulgaria, 745.
—, *Phytophthora parasitica* var. *rhei* and *Pythium ultimum* on, in S. Africa, 331.
Rhynchosporium secalis on barley in Germany, 37.
— — on rye in Russia, 282.
Rhytisma acerinum, production of ascigerous stage of, in culture, 547.
— *salicinum* on *Salix purpurea* in Czecho-Slovakia, 157.
— *shiraiana* on *Rhododendron macrosepalum* in Japan, 518; ascigerous stage of *Melasmia rhododendri*, 518.
Ribes eradication against *Cronartium ribicola* on pine in Canada, 553; in U.S.A., 142, 143, 161, 276, 486; cost of, 142.
Rice (*Oryza sativa*), *Achlya americana*, *A. flagellata* and its var. *yezoensis*, and *A. oryzae* on, in Japan, 397.
—, *Alternaria* on, in U.S.A., 159.
—, 'bakanae' disease of, see *Gibberella fujikuroi* on.
—, blast of, see *Piricularia oryzae* on.
—, 'brusone' of, breeding against, 400; control, 262; factors affecting, 202, 262; losses caused by, 202; occurrence in Italy, 202, 262, 400; varietal susceptibility to, 202.
—, collar rot of, see 'brusone' of.
[Rice], *Corticium centrifugum* on, in Japan, 539, 801.
—, — *sasakii* on, confused with *C. solani*, 1; factors affecting, 539; occurrence in Japan, 1, 538, 801; in the Philippines, 1.
—, — *solani* on, in Ceylon, 599.
—, *Dictyuchus sterile* on, in Japan, 397.
—, dwarf disease of, in Japan, 324.
—, *Fusarium arthrosporioides* and *F. culmorum* on, in Bulgaria, 745.
—, *Gibberella fujikuroi* on, bakanae disease attributed to, 332; control, 399; effect of culture filtrate of, on growth, 399, 400, 536, 537; *Lisea fujikuroi* renamed, 399; may be identical with *G. moniliformis*, 399; occurrence in Japan, 332, 399, 400, 536, 537; studies on, 332, 399, 536, 537; varietal susceptibility to, 399; wrongly identified as *Fusarium heterosporum*, 399.
—, — *saubinetii* on, in Japan, 537.
—, *Helminthosporium* on, in U.S.A., 159.
—, — *oryzae* on, in Indo-China, 433; in Peru, 225; in Russian Central Asia, 315. (See also *Ophiobolus miyabeanus*.)
—, *Ophiobolus miyabeanus* on, in Japan, 536. (See also *Helminthosporium oryzae*.)
—, — *oryzinus* on, in U.S.A., 469.
—, *Piricularia oryzae* on, factors affecting, 536, 538, 800, 801; nature of resistance to, 1; occurrence in India, 223; in Japan, 1, 536, 538, 800; in Russian Central Asia, 315; physiologic specialization in, 538; studies on, 538; varietal resistance to, 1.
—, *Pseudomonas itoana* on, in Japan, 536.
—, *Pythiomorpha miyabeana* and *P. oryzae* on, in Japan, 397.
—, *Pythium arrhenomanes* var. *philippinensis* can infect, 778.
—, *Sclerospora macrospora* on, in New S. Wales, 222.
—, *Sclerotium* on, in Japan, 801.
—, — Sakurai's 2 and 3 on, in Japan, 539.
—, — *oryzae* on, control, 158, 159, 600; *Helminthosporium sigmoideum* conidial stage of, 469; losses caused by, 158; occurrence in Ceylon, 599; in India, 158; in Indo-China, 433; in U.S.A., 159, 469; study on, 599; varietal resistance to, 158, 600; viability of sclerotia of, 600.
—, — *oryzae-sativae* on, in Japan, 539, 801.
—, — *phyllachoroides* on, in Japan, 801; identical with *Entostroma oryzae*, 801.
—, *Tilletia horrida* on, in China, 324.
—, (?) *Ustilaginoidea virens* on, in Sierra Leone, 97.
Ricinus communis, *Botrytis* (?) *cinerea* on, in Guatemala, 431.
— —, *Cercospora canescens* on, 130.
— —, *Pythium ascophallon* and *P. polycladon* on, in Hawaii, 546.
'Rigi' disease of cherry in Switzerland, 694.
Ring spot of tobacco, effect of, on yield, 284; host range of, 132, 284; local lesions in, 334; losses caused by, 133;

notes on, 406, 806; occurrence in France, 94; in Java, 750; in Nyasaland, 806; in Rumania, 607; in the Ukraine, 90; in U.S.A., 132, 133, 284, 334, 407; properties of virus of, 132; studies on, 132, 133; transmission of, by an insect vector, 133; by rubbing, 334; by seed, 133, (?) 284, 407; to beans, 6; to potato and tomato, 132; types of, 407, 607; virus of, affecting *Actinomeris alternifolia* in U.S.A., (?) 132, 133; (?) beet in the Ukraine, 90; *Datura stramonium*, (?) *Melilotus officinalis*, melon, (?) *Petunia violacea*, and (?) squash in U.S.A., 132; *M. alba* in U.S.A., 133.
Roesleria hypogaea on rose in England, 93.
Romagna M.S.R. sulphur, see Sulphur, Romagna M.S.R.
'Roncet' of vine, see Leaf roll.
Root disease of citrus in Jamaica, 625.
— — of sugar-cane, breeding against, 540; occurrence in Cuba, 327; in Mauritius, 127; in Porto Rico, 540; in Trinidad, 283; varietal resistance to, 540.
— knot of *Musa textilis*, see *Heterodera radicicola*.
— nodules of *Casuarina equisetifolia* in India, 797. (See also Mycorrhiza.)
— plate rot of *Narcissus* in U.S.A., 786.
— rot of clover in U.S.A., 461.
— — of cotton in India, 453; in Russia, 41.
— — of sorghum in U.S.A., 507.
Rose (*Rosa*), Actinomycete on, in Czecho-Slovakia, 459.
—, *Bacillus amylovorus* on, in U.S.A., 305.
—, *Bacterium tumefaciens* on, in Poland, 459.
—, *Botrytis cinerea* on, in New S. Wales, 784; in Poland, 459.
—, *Cercospora rosaecola* on, in Victoria, 516.
—, *Coniothyrium diplodiella* on, in U.S.A., 785.
—, — *wernsdorffiae* on, in Poland, 459.
—, *Diplocarpon rosae* on, in England, 375; in Switzerland, 694.
— diseases in U.S.A., 516, 649.
—, infectious chlorosis of, in Canada, 245.
—, *Leptosphaeria coniothyrium* on, in Holland, 767.
—, *Marssonina rosae* on, in Poland, 459.
— mosaic in Canada, England, and U.S.A., 374.
—, *Mycosphaerella rosigena* on, in Queensland, 517.
—, *Peronospora sparsa* on, control, 459, 784; occurrence in Poland, 459.
—, *Phragmidium mucronatum* on, control, 459, 578, 694; occurrence in France, 578; in Poland, 459; in Switzerland, 694; varietal susceptibility to, 578.
—, *Phyllosticta rosae* on, in Queensland and Victoria, 516.
—, (?) — *rosarum* on, in Australia, 517.
—, *Roesleria hypogaea* on, in England, 93.
[Rose], *Septoria rosae* on, note on, 516.
—, — *rosae-arvensis* on, in Poland, 459.
—, — *rosarum* on, in Poland, 459; in Spain, 329.
—, *Sphaerotheca pannosa* on, *Cicinnobolus cesatii* parasitizing, 377; control, 28, 459, 680; factors affecting, 799; occurrence in England, 680; in Germany, 799; in Poland, 459; in U.S.A., 28, 377.
—, *Sporotrichum beurmanni* can infect, 647.
—, *Verticillium* (?) *ovatum* on, in Canada, 245.
Rosellinia on avocado pear in Jamaica, 625.
— on *Cinchona* in Indo-China, 433.
— *abietina* var. *trichota* on timber in Russia, 616.
— *ambigua* on timber in Russia, 612.
— *arcuata* on apple in Ceylon, 223.
— (?) — on coffee in India, 367.
— *bunodes* on cacao in St. Lucia, 26.
— — on *Erythrina* in St. Lucia, 26.
— *necatrix* on fruit trees in Cyprus, 110.
— — on vine in Italy, 765; in Switzerland, 24.
— *pepo* on cacao and *Erythrina* in St. Lucia, 26, 698.
— *pulveracea* on timber in Russia, 612, 616.
— *schumacherii* renamed *Microascus schumacherii*, 6.
— *zingiberi* on ginger in the Philippines, 74.
Rosette of groundnut, *Aphis laburni* as vector of, 697; control, 93, 697; factors affecting, 27; 'gana' and 'leprosy' synonyms of, 92; host range of, 697; occurrence in the Gambia, 27, 697; in Madagascar, 699; in Senegal, 92; study on, 697; varietal resistance to, 27, 93, 697.
— of lucerne in New S. Wales, 222.
— of peach in U.S.A., 356, 430.
— of pecan in U.S.A., 213, 683.
Rota Generator sulphur fumigation apparatus, 254.
Rottboellia exaltata, streak disease of, in S. Africa, 67.
Rotterdam B disease of tobacco in Sumatra, 333.
Rubber (*Hevea brasiliensis*), *Botryodiplodia theobromae* on, in Indo-China, 432.
—, brown bast of, in Indo-China, 432.
—, *Ceratostomella fimbriata* on, in Malaya, 744, 768.
—, collar disease of, in Indo-China, 539.
—, *Corticium* on, in the Belgian Congo, 2.
—, — *salmonicolor* on, in Malaya, 744.
—, die-back of, in Ceylon, 400; in Java, 72, 539.
— diseases in Ceylon, 1; disinfection of bud wood against, 402.
—, *Dothidella ulei* on, legislation against, in Dutch E. Indies, 608.
—, *Fomes lamaoensis* on, control, 2, 72; hosts of, 72; occurrence in the Bel-

gian Congo, 2; (?) in Indo-China, 432; in Java, 72.
[Rubber, *Fomes*] *lignosus* on, control, 2, 72; factors affecting, 672; notes on, 2, 72; occurrence in the Belgian Congo, 2; in Ceylon, 400; in Java, 72; in Malaya, 2, 672, 744; in Sumatra, 72.
—, — *pseudoferreus* on, see *Ganoderma pseudoferreum* on.
—, *Fusarium* on, in Indo-China, 432.
—, *Ganoderma pseudoferreum* on, control, 2, 72, 324; (?) a variety of *G. applanatum*, 402; notes on, 2, 72; occurrence in the Belgian Congo, 2; in Java, 72; in Malaya, 2, 324, 402, 744; studies on, 325, 402; wet root rot of Malaya due to, 402.
—, *Gloeosporium* on, in Indo-China, 433.
—, — *albo-rubrum* on, in Indo-China, 432.
—, *Helminthosporium heveae* on, in Indo-China, 433; in Malaya, 2.
—, *Oidium heveae* on, control, 126, 401, 469, 470, 672, 801; effect of, on yield, 401; occurrence in Ceylon, 126, 401, 801; in Java, 469, 470, 672; in Malaya, 401, 744, 768.
—, physiological disease of, in the Belgian Congo, 2.
—, *Phytophthora* on, control, 432, 802; legislation against, in Dutch E. Indies, 608; occurrence in Ceylon, 802; in Indo-China, 432; in Java, 71.
—, — *palmivora* on, in Ceylon, 401; in Java, 600.
—, *Poria* on, in Indo-China, 432.
—, *Sphaerostilbe repens* on, control, 2; occurrence in the Belgian Congo, 2; in Indo-China (from Sumatra), 432; in Malaya, 672.
—, top die-back of, in Java, 202.
—, *Ustulina zonata* on, control, 2; occurrence in the Belgian Congo, 2; in Ceylon, 400; in Malaya, 325, 672.
—, prepared, moulds on, control, 802.
Rubus, *Phyllosticta ruborum* on, in Bulgaria, 475.
—, *Spirechina pittieriana* on, in Guatemala, 606.
—, see also Blackberry, Dewberry.
— *idaeus*, see Raspberry.
— *loganobaccus*, see Loganberry.
— *occidentalis*, see Raspberry.
Rueping process of timber preservation, 815.
'Rust' of cotton in U.S.A., 160, 638.
Rusts of cereals, epidemiology of, in Russia, 627.
— of New Zealand, monograph on, 263; of Norway, 675; of S. America, 128, 404, 546; of Saghalien, 332.
—, see also Uredinales.
Rye (*Secale cereale*), *Bacterium translucens* var. *undulosum* on, in U.S.A., 434.
—, *Calonectria graminicola* on, control, 707, 777; factors affecting, 777; occurrence in Germany, 707; in Latvia, 777; in Poland, 694.
[Rye], *Claviceps purpurea* on, in Germany, 38; in Russia, 282.
—, *Erysiphe graminis* on, in Czecho-Slovakia, 157.
—, *Fusarium* on, in Germany, 775.
—, — *culmorum* on, in Lithuania, 632.
—, *Helminthosporium tritici-repentis* on, in Poland, 695.
—, *Heterosporium secalis* on, in S. Africa, 267.
—, magnesium deficiency in, in Germany, 101.
—, *Ophiobolus herpotrichus* on, in Czecho-Slovakia, 157.
—, *Puccinia* on, in Russia, 628.
—, — *graminis* on, germination of teleutospores of, 164; infection of barberry by, in S. Africa, 164; notes on, 164; occurrence in Czecho-Slovakia, 157; in Germany, 31; in S. Africa, 164, 230; in U.S.A., 437; physiologic forms of, 231, 437; varietal resistance to, 230.
—, — *secalina* on, factors affecting, 98; note on, 31; occurrence in the Argentine, 358; in Brazil, 358; in Czecho-Slovakia, 157; in Germany, 31, 98; in Paraguay, 358; in Uruguay, 358; study on, 98.
—, *Pythium* can infect, 294.
—, — *arrhenomanes* var. *canadensis* can infect, 435.
—, *Rhynchosporium secalis* on, in Russia, 282.
—, *Septoria tritici* on, in Bulgaria, 745.
—, soil acidity disease of, in Germany, 471.
—, *Tilletia caries* can infect, 501.
—, — *secalis* on, in Czecho-Slovakia, 233.
—, *Urocystis occulta* on, control, 38, 162, 706; occurrence in Denmark, 162; in Germany, 38; in Poland, 706.

Sabouraudites felineus, cutaneous electivity in, 107.
—, see also *Microsporon*, *Trichophyton*.
Saccharomyces ellipsoideus, toxicity of acetic, benzoic, salicylic, and sulphurous acids to, 466.
— *jadini* on man in France, 642.
— *sternoni* on man in France, 457.
Saccharomycodes ludwigii, a constituent of the 'tea fungus' of Java, 548, 676.
Saccharum officinale, see Sugar-cane.
Safflower (*Carthamus tinctorius*), *Sclerotinia sclerotiorum* on, in Russia, 652.
S.A.I.M. sulphur, see Sulphur, S.A.I.M.
Salicylanilide a constituent of shirlan paste (q.v.), 679.
—, use of, against moulds on prepared rubber, 802.
Salicylic acid, toxicity of, to micro-organisms, 466.
— —, use of, against *Ceratostomella paradoxa* on pineapple, 192; as a timber preservative, 815.
Salix, bacterial disease of, in Holland, 411.
—, *Bacterium tumefaciens* on, in Czecho-Slovakia, 157.

[*Salix*], *Cryptomyces maximus* on, in Scotland, 139.
—, *Fusicladium saliciperdum* on, in England, 139. (See also *Venturia chlorospora* on.)
—, *Helicobasidium purpureum* on, in Czecho-Slovakia, 157.
—, *Marssonina salicicola* and *Melampsora* on, in England, 139.
—, *Physalospora miyabeana* on, in England, 139, 214.
—, *Stereum purpureum* on, in New Zealand, 247.
—, *Trametes suaveolens* on, in U.S.A., 811.
—, *Venturia chlorospora* on, pathogenicity of, 214. (See also *Fusicladium saliciperdum* on.)
— *alba* var. *vitellina*, *Fusicladium saliciperdum* on, in U.S.A., 161.
— *americana*, *Bacterium tumefaciens* on, in Czecho-Slovakia, 274.
— —, *Physalospora miyabeana* can infect, 214.
— *amygdalina*, bacterial disease of, in Holland, 551.
— *caerulea*, *Discella carbonacea* on, in England, 423.
— *caprea*, bacterial disease of, in Holland, 551.
— —, *Melampsora euonymi-caprearum* and *M. ribesii-salicum* on, in Italy, 412.
— *grandifolia*, *Melampsora ribesii-salicum* on, in Italy, 412.
— *helvetica* and *S. herbacea*, *Melampsora* on, in Italy, 412.
— *pentandra*, *Trametes suaveolens* on, in U.S.A., 811.
— *purpurea*, bacterial disease of, in Holland, 551.
— —, *Melampsora ribesii-salicum* on, in Italy, 412.
— —, *Physalospora miyabeana* can infect, 214.
— —, *Rhytisma salicinum* on, in Czecho-Slovakia, 157.
— *reticulata*, *Melampsora alpina* and *M. reticulata* on, in Italy, 412.
— *retusa*, *Melampsora arctica* on, in Italy, 412.
— *serpillifolia*, *Melampsora* on, in Italy, 412.
— *triandra*, bacterial disease of, in Holland, 551.
— —, *Melampsora amygdalinae* on, in England, 756.
— *urbaniana*, *Fomes vegetus* on, in Japan, 12.
— *viminalis*, (?) bacterial disease of, in Holland, 551.
— —, *Melampsora* on, in Czecho-Slovakia, 157.
— —, — *larici-epitea* on, in England, 756.
— —, — *ribesii-viminalis* on, in Italy, 412; in Spain, 329.
— —, *Septoria salicicola* on, in Spain, 329.
— *vitellina*, *Physalospora miyabeana* can infect, 214.
Salpiglossis, tomato spotted wilt can infect, 549.
Salsify (*Tragopogon porrifolius*), *Sclerotinia sclerotiorum* on, in Germany, 489.
—, black, see *Scorzonera*.
Salt, common, see Sodium chloride.
Saltation in *Achorion gypseum*, 645; in *Alternaria*, 393; in *Bacterium translucens* var. *undulosum*, 434; in *Chaetomium cochlioides*, 593; in *Helminthosporium*, 393; in *Mucor genevensis*, 593; in *Pestalozzia funerea*, 413; in *Phoma conidiogena*, 581; in *Phycomyces blakesleeanus*, 593; in *Stemphylium*, 393; in *Trichophyton gypseum*, 646.
Salvia officinalis, *Monopus caballeroi* on, in Spain, 675.
Salvocer, effect of, on germination of wheat, 567.
Sanagran VIII, use of, against *Pleospora graminea* on barley, *Urocystis occulta* on rye, *Ustilago avenae* on oats, and wheat bunt, 162.
Sand burn of pecan in U.S.A., 213.
— drown of maize and tobacco in U.S.A., 471.
Sandalwood (*Santalum album*), *Phytophthora* on, in India, 158, 509.
—, spike disease of, in India, 81, 336.
Sanoseed, use of, against *Actinomyces scabies* on potato, 259; against *Bacterium pruni* on peach, 355.
Sansevieria zeylanica, *Gloeosporium sansevieriae* on, in S. Africa, 268.
Santalum album, see Sandalwood.
Sap stain of timber in Canada, 615; in U.S.A., 816.
Saponin, use of, as spreader, 211, 375.
Sawdust + formalin, use of, against *Ustilago avenae* on oats and wheat bunt in Russia, 35.
'Scabbed leaf' of tea in Indo-China, 433.
Scald of apple, control, 658, 659; factors affecting, 54; occurrence in England, 659; in U.S.A., 53, 54, 658; varietal susceptibility to, 53, 54. (See also Soft scald.)
— of grapefruit in U.S.A., 570.
— of pear in U.S.A., 54. (See also Anjou scald.)
Scale insects, *Verticillium cinnamomeum* on, in U.S.A., 641; wrongly referred to *V. heterocladum*, 641.
— —, *Volutella epicoccum* on, 179.
Scalecide, use of, against *Venturia inaequalis* on apple, 161.
Scaly bark of citrus in Jamaica, 26.
Scedosporium apiospermum and *S. magalhaesi* on man in Brazil, 242.
Schizanthus, tomato spotted wilt can infect, 549.
Schizophyllum commune, resistance of, to extreme cold, 318.
— —, tests of timber preservatives against, 15, 84.
— —, toxicity of arsenic and copper sulphate to, 84.
Schumann rays, effect of, on fungus cultures, 593.
Scirrhia (?) *agrostidis* on *Agrostis alba* var. *stolonifera* in France, 722; synonymy

of, 722 ; *Hadrotrichum virescens* conidial stage of, 722.
Sclerospora graminicola can infect *Euchlaena mexicana*, 635.
— — on *Pennisetum typhoideum* in India, 507, 634.
— — on *Setaria* in U.S.A., 634.
— — var. *andropogonis* renamed *S. sorghi*, 635.
— *indica* on maize in India, formerly identified as *S. maydis*, 546.
— *javanica* Palm should be known as *S. maydis* (Racib.) Palm, 546.
— *macrospora* on rice in New S. Wales, 222.
— *maydis*, synonymy of, 283, 546.
— *philippinensis*, *S. maydis* (*S. indica*) synonym of, 283.
— *sacchari* can infect *Euchlaena luxurians* and maize, 425.
— — on sugar-cane, 403 ; in India, 425.
— *sorghi* can infect *Euchlaena mexicana*, 635.
— — on maize in India, 635.
— — on sorghum in India, 634, 635 ; *S. graminicola* var. *andropogonis* renamed, 635.
Sclerotial fungus on *Narcissus* in U.S.A., 786.
Sclerotinia on apple in the Caucasus, 53.
— on apricot in Switzerland, 187.
— on lettuce in U.S.A., 589.
—, sexual function of microconidia in, 665.
— *americana* on peach, control, 661 ; occurrence in Canada, 249, (?) 790 ; in U.S.A., 661 ; studies on, 249, 790.
— —, physical factors affecting toxicity of sulphur preparations to, 385.
— —, spore germination tests of, 730.
— *cinerea* on apricot, note on, 791 ; occurrence in England, 93 ; in France, 791 ; in Spain, 307.
— — on cherry in Norway, 582 ; in Spain, 307.
— — on fruit trees, legislation against, in England, 80 ; occurrence in the Caucasus, 58 ; in England, 80.
— — on peach and plum in Spain, 307.
— —, production of sulphuretted hydrogen by, from sulphur, 465.
— —, toxicity of pentathionic acid, sulphur, sulphur dioxide, and sulphuretted hydrogen to, 465.
— — f. *pruni* on cherry in England, 311.
— *cydoniae* on quince in England, 93.
— *fructigena* on apple, ascigerous stage of, 310 ; note on, 53 ; occurrence in the Caucasus, 53 ; in Russia, 310 ; in Spain, 307.
— — on fruit in Asiatic Russia, 316.
— — on fruit trees, legislation against; in England, 80.
— — on pear in Spain, 307.
— *fuckeliana* on potato in Hungary, 222.
— *gladioli* ascigerous stage of *Sclerotium gladioli*, 666.
— — on crocus and freesia in Holland, 767 ; in N. America, 665.
— — on gladiolus in N. America, 665.
(?) [*Sclerotinia gladioli*] on *Narcissus* in U.S.A., 786.
— —, sexual function of microconidia in, 665.
— (?) *intermedia* on beet in the Ukraine, 556.
— *laxa*, see *S. cinerea*.
— *mespili* on medlar in England, 94.
— *minor* on lettuce in Germany, 492.
— *nicotianae* on tobacco in Hungary, 222.
— *oxycocci* on cranberry in U.S.A., 188.
— *sclerotiorum* can infect *Helianthus tuberosus*, 652.
— —, host range of, in New Zealand, 547.
— — on *Amaranthus retroflexus* in U.S.A., 313.
— — on apricot in Queensland, 157.
— — on artichoke in U.S.A., 429.
— — on banana in Palestine, 173.
— — on bean in U.S.A., 313.
— — on beet, carrot, and celery in Germany, 489.
— — on chilli in U.S.A., 803, (?) 804.
— — on cruciferous weeds in Russia, 45.
— — on cucumber in Germany, 620.
— (?) — on endive in Holland, 767.
— — on *Ficus magnolioides* in U.S.A., 313.
— — on flax in Russia, 45.
— — on hemp in Russia, 652.
— — on lettuce in U.S.A., 313.
— — on lupin in Russia, 652.
— — on mulberry in Bulgaria, 485.
— — on orange in Palestine, 172.
— — on parsley in Germany, 489.
— — on potato in Norway, 670 ; in Russia, 652.
— — on safflower in Russia, 652.
— — on salsify in Germany, 489.
— (?) — on *Scorzonera hispanica* in Holland, 767.
— — on soy-bean in Russian Central Asia, 316 ; in Siberia, 87.
— — on sunflower in Russia, 652 ; in Siberia, 87.
— — on tobacco in Russia, 652.
— — on various hosts in the Ukraine, 556.
— —, production of sulphuretted hydrogen by, from sulphur, 465.
— —, serological studies on, 798.
— *trifoliorum* on *Anthyllis vulneraria* in Denmark, 768.
— — on clover, control, 720 ; factors affecting, 25 ; losses caused by, 25 ; occurrence in Canada, 246 ; in Denmark, 304, 768 ; in Esthonia, 25 ; in Germany, 559, 720 ; in U.S.A., 461.
— — on *Medicago* in Denmark, 768.
— — on *Medicago scutellata* in Denmark, 304.
— — on *Melilotus alba* in Canada, 246.
Sclerotium on *Cicer arietinum* in India, 425.
— on rice in Japan, 801.
— on sugar-cane causing banded sclerotial disease in Indo-China, 432.
— Sakurai's Nos. 2 and 3 on rice in Japan, 539.

[*Sclerotium*] *centrifugum* on aster (China) in Italy, 405, 746, 748 ; sclerotial stage of *Corticium centrifugum* named, 749.
— *cepivorum* on onion in Egypt, 219.
— *coffeicolum* on coffee in British Guiana, 26 ; in Trinidad, 283.
— *delphinii* on iris in Holland, 96.
— — on *Narcissus* in U.S.A., 785.
— — on tulip in Holland, 767.
— —, relation of, to *S. rolfsii* and *S. centrifugum*, 405, 748, 749.
— *gladioli*, see *Sclerotinia gladioli*.
— *oryzae* on rice, control, 158, 159, 600 ; *Helminthosporium sigmoideum* conidial stage of, 469 ; losses caused by, 158 ; occurrence in Ceylon, 599 ; in Indo-China, 433 ; in India, 158 ; in U.S.A., 159, 469 ; study on, 599 ; varietal resistance to, 158, 600 ; viability of sclerotia of, 600.
— — *-sativae* on rice in Japan, 539, 801 ; factors affecting, 539.
(?) — *perniciosum* on *Narcissus* in Denmark, 460.
— — on tulip in Holland, 376.
— *phyllachoroides* on rice in Japan, 801 ; identical with *Entostroma oryzae*, 801.
— *rhizodes* on *Agrostis* in England, 423, 654.
— — on grasses in England, 654.
— — on wheat in U.S.A., 499.
— *rolfsii*, *Corticium rolfsii* perfect stage of, 748, 749 ; *S. centrifugum* distinguished from, 749.
— —, host range of, 349.
— — on *Abutilon* in India, 158.
— — on aster (China), see *Sclerotium centrifugum* on.
— — on beans in the Gold Coast, 696 ; in U.S.A., 349.
— — on beet in U.S.A., 349.
— — on carrot in U.S.A., 298, 349.
— — on chilli, control, 803 ; occurrence in U.S.A., 349, 803, 804.
— — on *Colocasia antiquorum* in the Gold Coast, 763.
— — on cotton, control, 298 ; occurrence in India, 560 ; in U.S.A., 298, 349 ; study on, 298.
— — on cucumber in U.S.A., 349.
— — on eggplant in Ceylon, 223 ; in U.S.A., 349.
— — on flowers in Jamaica, 547.
— — on groundnut, control, 621 ; occurrence in Guatemala, 431 ; in Madagascar, 699 ; in U.S.A., 621 ; varietal resistance to, 621.
— — on *Helianthus tuberosus* in the Gold Coast, 696.
— — on hemp in India, 158.
— — on *Hibiscus cannabinus* in India, 158.
— — on lettuce in U.S.A., 349.
— — on *Narcissus* in U.S.A., 785.
— — on peas in U.S.A., 349.
— — on *Piper betle* in India, 158, 283.
— — on potato, control, 547 ; *Corticium rolfsii* perfect stage of, 748, 749 ; occurrence in Italy, 406, 746, 748 ; in Jamaica, 26, 547 ; in U.S.A., 349 ; studies on, 406, 746, 748.
[*Sclerotium rolfsii*] on squash in U.S.A., 349.
— — on sugar-cane, control, 432, 547 ; occurrence in Indo-China, 432 ; in Jamaica, 547 ; (?) in the Philippines, 203.
— — on sweet potato in Jamaica, 547 ; in U.S.A., 535.
— — on tomato, control, 547 ; occurrence in Jamaica, 547 ; in the Philippines, 285 ; in Trinidad, 610 ; in U.S.A., 349.
— — on vegetables in Jamaica, 547.
— — on watermelon in U.S.A., 349.
— — on *Xanthosoma sagittifolium* in the Gold Coast, 763.
— —, relation of *S. delphinii* to, 405, 748, 749 ; of *S. centrifugum* to, 749.
— —, Wolf's American strain of, determined as *S. centrifugum*, 749.
— *tulipae* on tulip in Italy, 388.
— *tuliparum* on *Colchicum* in England and Wales, 423.
— — on tulip, control, 376, 460, 694 ; occurrence in Denmark, 460 ; in Holland, 376 ; in Switzerland, 694.
Scolytus, transmission of *Ceratostomella ulmi* on elm by, in France, 409 ; in Germany, 14, 274, 275 ; in Holland, 138, 337, 484 ; in Switzerland, 483.
Scopulariopsis on copra in England, 175.
—, perithecial stages of, 6.
—, relation of, to *Aspergillus*, *Penicillium*, and *Microascus*, 6.
—, subsection *anomala* of *Penicillium* regarded as belonging to, 6.
Scorias philippinensis on *Ficus hauili* in the Philippines, 547.
Scorzonera hispanica, *Sclerotinia* (?) *sclerotiorum* on, in Holland, 767.
Secale cereale, see Rye.
Seed-borne diseases, bibliography of, 386.
— — — in Scotland, 255 ; control of, in Western Australia, 253.
— — micro-organisms, relationship of, to the host, 255.
— certification in Germany, 65.
— disinfectant dusts, adherence of, 441, 502, 586.
— disinfection apparatus, 36, 232, 290, 295, 775.
— —, co-operative methods of, 36, 707, 775.
— — in Germany, 36, 65, 665, 707, 775 ; in Holland, 64.
— —, recent advances in, 35, 665.
— steeping injury, 17.
Sejus pomi, transmission of fig diseases by, in U.S.A., 522.
Selecta Fungorum Carpologia, English translation of, 197.
Semesan, use of, against *Actinomyces scabies* on potato, 626 ; against *Ascochyta pinodella* on peas, 17 ; against *Fusarium* on *Narcissus*, 699 ; against *Monilochaetes infuscans* on sweet potato, 626 ; against *Mycosphaerella pinodes* on

peas, 17 ; against *Sclerotium rolfsii* on cotton, 298.
[Semesan] bel, use of, against *Actinomyces scabies* and *Corticium solani* on potato, 671.
— jr., use of, against *Pythium de Baryanum* and *Rhizoctonia* on cucumber, 350.
Senecio hieracifolia, pineapple yellow spot can infect, 586.
Sepedonicum chrysospermum in soil in U.S.A., 264.
Septogloeum arachidis synonym of *Cercospora personata*, 20.
Septol, use of, against *Fusarium oxysporum cubense* on banana, 25.
Septoria on blackberry in England, 61.
— on poplar in Canada, 137.
—, phenology of, in Austria, 799.
— *acicola* on pine in U.S.A., 813.
— *antirrhini* on *Antirrhinum majus* in Spain, 329.
— *apii* on celery in England, 91.
— *briosiana* on wheat in Italy and Spain, 329.
— *carvi* on *Carum carvi* in Germany, 474.
— *cercosporoides* on *Chrysanthemum leucanthemum* in S. Africa, 267.
— *chrysanthemella* on chrysanthemum in Germany, 785.
— *cucurbitacearum* on vegetable marrow in Bulgaria, 745 ; in Kenya, 159.
— *cyclaminis* on cyclamen in Germany, 650.
— (?) *depressa* on lemon and orange in New S. Wales, 780.
— *fragariae* on strawberry in England, 726.
— *gladioli* on gladiolus in Switzerland, 24 ; in U.S.A., 356.
— *glycines* on soy-bean in Siberia, 88.
— *graminum* on wheat in France, 709.
— *lilii* on lily in Japan, 786.
— *lycopersici* on tomato, control, 589, 753 ; occurrence in Esthonia, 25 ; in Guatemala, 431 ; in New S. Wales, 753 ; in S. Africa, 210 ; in Trinidad, 610 ; in U.S.A., 589.
— *monspessulani* on *Acer monspessulanum* in Spain, 329.
— *nodorum* on wheat, control, 445 ; factors affecting, 444 ; note on, 766 ; occurrence in Germany, 444 ; in Holland, 766 ; in Kenya, 163 ; study on, 444.
— *passerini* on barley and *Hordeum* spp. in Bulgaria, 745.
— *pisi* on peas in New S. Wales, 222.
— *populi* on poplar in Spain, 329.
— *pyricola* on pear in S. Africa, 267.
— *rosae* on rose, 516.
— — *-arvensis* on rose in Poland, 459.
— *rosarum* on rose in Poland, 459 ; in Spain, 329.
— *rostrupii* on chrysanthemum in Germany, 785.
— *rubi*, see *Mycosphaerella rubi*.
— *salicicola* on *Salix viminalis* in Spain, 329.
— *tritici* on *Poa pratensis* and rye in Bulgaria, 745.
[*Septoria tritici*] on wheat in Bulgaria, 745 ; in Czecho-Slovakia, 157.
Sereh disease of sugar-cane, distribution of, 403.
Serological studies on *Bacillus aroideae* and other soft rotting bacteria in Japan, 700 ; on *Bacterium malvacearum*, 298 ; on *Cylindrocarpon album*, *Fusarium*, *F. conglutinans*, *F. oxysporum*, *Neurospora tetrasperma*, *Ramularia*, and *Sclerotinia sclerotiorum*, 798.
Sesame (*Sesamum indicum*), *Alternaria sesamicola* on, in Japan, 350.
—, *Cercospora sesami* on, in Uganda, 353.
—, *Macrophomina phaseoli* on, in India, 223.
—, *Macrosporium sesami* on, in Japan, 350.
— oil, toxicity of, to *Sphaerotheca humuli*, 253.
Sesbania, *Phymatotrichum omnivorum* can infect, 177.
Setaria, *Sclerospora graminicola* on, in U.S.A., 634.
— *sulcata*, mosaic of, in S. Africa, 541.
— *verticillata*, streak disease of, in S. Africa, 67.
Sheep, *Actinomyces dermatonomus* on, in New Zealand, 641 ; in S. Africa, 457.
Shirlan, composition of, 679 ; use of, against *Cladosporium fulvum* on tomato, 211, 679 ; against *Erysiphe cichoraceae-rum* on cucumber, *Oidium chrysanthemi* on chrysanthemum, and *Sphaerotheca pannosa* on rose, 680.
Shorea and *S. guiso*, *Fomes pachyphloeus* on, in the Philippines, 613.
'Sigvardt' motor spraying apparatus, 196.
Silene maritima, *Uromyces behenis* on, in France, 722.
Silico-fluorides, use of, as timber preservatives, 815.
Silk, artificial, see Artificial silk.
Silkworm, *Aspergillus fulvus* on the, 179.
'Silver leaf' of mulberry in Italian Somaliland, 476.
— nitrate, use of, against *Colletotrichum* on tobacco, 753 ; against *Pleospora alternariae* on tobacco, 77.
Single spore cultures, methods of making, 531.
Sipunculus nudus, *Bacterium tumefaciens* can infect, 227.
Sirodesmium granulosum on timber in Russia, 616.
Sisal (*Agave rigida* var. *sisalana*), disease in, in Tanganyika, 107.
Sitotroga cerealella in relation to *Nigrospora oryzae* on maize in Rumania, 296.
Slater hypochlorite process, use of, against *Penicillium digitatum* and *P. italicum* on citrus, 570.
Small leaf of strawberry, note on, 250.
Smilax, *Parascorias spinosa* on, in the Philippines, 547.
Smuttox, composition of, and use of, against *Ustilago avenae* and *U. kolleri* on oats, 634.

Snowdrop (*Galanthus nivalis*), *Botrytis galanthina* on, in Denmark, 460.
Soap as an emulsifier, 253.
— as a spreader, 194, 380, 464, 582, 587, 732.
Soda, see Sodium carbonate.
Sodium arsenate, use of, against wheat bunt, 290 ; as a timber preservative, 415.
— arsenite, adhesiveness of, to seed grain, 441.
— — + linseed oil as a wound dressing, 186.
— benzoate, use of, as a preservative, 466.
— bicarbonate, use of, against *Penicillium* on citrus, 105, 570.
— bichromate, use of, as a timber preservative, 83, 217.
— carbonate content in Burgundy mixture in relation to injury, 429.
— —, use of, against *Gloeodes pomigena* on oranges, 105 ; against mould and sap stain of timber, 816 ; against *Sphaerotheca mors-uvae* on gooseberry, 380.
— chlorate soil treatment against *Ganoderma pseudoferreum* on tea, 131.
— chloride, preservative action of, 466.
— 2-chloro-orthophenylphenolate, use of, against mould and sap stain of timber, 816.
— dinitrophenol, use of, as a timber preservative, 415.
— fluoride, as a constituent of etymolos, mykanthine, and raco, 217.
— —, use of, as a timber preservative, 83, 85, 415, 488, 554, 617.
— formaldehydesulphite and sodium formaldehydesulphoxylate, fungicidal tests of, 732.
— hydroxide, use of, against *Clasterosporium carpophilum* and *Sclerotinia cinerea* on cherry, 582 ; against *Sphaerotheca mors-uvae* on gooseberry, 380.
—, hypochlorite, toxicity of, to *Phymatotrichum omnivorum*, 370.
— metabisulphite, fungicidal properties of, 732.
— orthophenylphenolate, use of, against mould and sap stain of timber, 816.
— polysulphide, fungicidal properties of, 732.
— salicylate, preservative action of, 466.
— sulphate as a constituent of mycothanaton, 217.
— sulphide and sodium sulphite, fungicidal properties of, 732.
— taurocholate, tolerance of *Aplanobacter stewarti* for, 561.
— —, use of, in media, 723.
— tetrachlorophenolate, use of, against mould and sap stain of timber, 816.
— thiosulphate, non-toxicity of, 730, 732.
Soft scald of apple in U.S.A., 53, 54. (See also Scald of.)
— suture of peach, attributed to spray injury, in U.S.A., 520.
Soil acidity disease of oats and rye in Germany, 471.
— disinfection against *Bacterium tabacum* on tobacco, 497 ; against *Bact. tumefaciens* on raspberry, 428 ; against *Corticium solani* on cabbage, 417 ; on *Piper betle*, 426 ; against *Cylindrocarpon radicicola* on lily, 243 ; against damping-off of pine and other plants, 496 ; against *Fusarium cubense* on banana, 25 ; against mushroom diseases, 493 ; against *Phytophthora parasitica nicotianae* on tobacco, 750 ; against *Pythium* root rot of sugar-cane, 5 ; against *Rhizoctonia* on *Piper betle*, 158 ; against *Roselinia necatrix* on fruit trees, 110 ; against *Sclerotinia minor* on lettuce, 492 ; against *Sclerotium rolfsii* on *Piper betle*, 158 ; against *S. tuliparum* on tulip, 694 ; against seed bed diseases, 253 ; against *Synchytrium endobioticum* on potato, 322 ; against tobacco diseases, 497 ; against *Verticillium* on chrysanthemum, 375.
— fungi, effect of fertilizers on, in Belgium, 803.
— microbiology, principles of, 470.
— micro-organisms, prevalence of, near roots, 803.
— 'sickness' and its control in Germany, 72.
— sterilization by heat against *Plasmodiophora brassicae* on cabbage and other species of *Brassica*, 686 ; against *Pythium* root rot of sugar-cane, 5 ; against seed bed diseases, 253.
— — — —, methods of, in Germany, 589 ; in U.S.A., 589.
— — — steam against *Ascochyta pinodella* and *Mycosphaerella pinodes* on peas, 345 ; against root rot of sorghum, 507 ; against *Sclerotinia minor* on lettuce, 492 ; against *Sclerotium rolfsii*, 547 ; against seed bed diseases, 253 ; against *Xylaria mali* on apple, 284 ; municipal plant for, in England, 471.
Soja, see Soy-bean.
Solanaceae, virus diseases of, in Ceylon, 223.
Solanum, 'spot' of, in Mexico, 397.
—, tomato spotted wilt can infect, 549.
— *antipoviczii*, *Phytophthora infestans* on, in Mexico, 672.
— *capsicastrum*, *Didymella lycopersici* can infect, 809.
— *demissum*, physiological disease of, in Mexico and U.S.A., 672.
— —, *Puccinia pittieriana* on, in Mexico, 397, 672.
— *dulcamara*, *Didymella lycopersici* can infect, 809.
— *melongena*, see Eggplant.
— *nigrum*, *Bacterium solanacearum* on, in Porto Rico, 29.
— —, *Didymella lycopersici* can infect, 809.
— —, tomato aucuba mosaic infecting, intracellular bodies of, 335.
— *torvum*, *Bacterium solanacearum* on, in Porto Rico, 29.

[*Solanum*] *tuberosum*, see Potato.
— *verrucosum*, *Phytophthora infestans* on, in Mexico, 397.
Solbar, use of, against *Cladosporium cucumerinum* on cucumber, 691; against *C. fulvum* on tomato, 680, 767; against *Didymella applanata* on raspberry, 382; against *Hemileia vastatrix* on coffee, 41.
Solignum earth oil, use of, as a timber preservative, 146.
Solol, composition of, and toxicity of, to *Sphaerotheca humuli*, 253.
Sonchus arvensis as a host for beet mosaic in the Ukraine, 90.
— *oleraceus*, pineapple yellow spot can infect, 586.
Sooty blotch of plum in England, 22.
— moulds of cotton in Italian Somaliland, 475.
Sophora japonica, *Olpidium trifolii* and *O. viciae* can infect, 720.
Sordaria in a butter churn in U.S.A., 181.
Sorghum (*Andropogon sorghum*), *Bacillus sorghi* on (?) in the Gold Coast, 696; *Bacterium holci* may be mistaken for, in S. Europe, 364.
—, bacterium on, in U.S.A., 507.
—, *Fusarium* on, in U.S.A., 507.
—, *Helminthosporium nodulosum* can infect, 426.
—, *Macrophomina phaseoli* on, in India, 104, 560.
—, *Phytomonas rubrilineans* can infect, 473.
—, root rot of, in U.S.A., 507.
—, *Sclerospora sorghi* on, in India, 634, 635; *S. graminicola* var. *andropogonis* renamed, 635.
—, *Sorosporium reilianum* on, in Nyasaland and Tanganyika, 235.
—, *Sphacelotheca cruenta* on, in Tanganyika, 235.
—, — *sorghi* on, control, 103, 235, 449; occurrence in India, 103; in Tanganyika, 235; in U.S.A., 448; physiologic forms of, 448; varietal susceptibility to, 235.
—, *Tolyposporium ehrenbergii* on, in Tanganyika, 235.
Sorghum lanceolatum, *Cerebella andropogonis* on, (?) in the Sudan, 544.
— *verticilliflorum*, *Phytomonas rubrilineans* can infect, 473.
Sorosporium reilianum on sorghum in Nyasaland and Tanganyika, 235.
Soy-bean (*Glycine*, *Soja*), *Alternaria tenuis* on, in Siberia, 89.
—, *Ascochyta* on, in Russian Central Asia, 316.
—, — *sojaecola* on, in Siberia, 88.
—, *Bacterium glycineum* on, in New S. Wales, 222.
—, — *phaseoli* var. *sojense* on, in New S. Wales, 222; in U.S.A., 18.
—, — *sojae* on, in Siberia, 315.
—, *Cercospora daizu* on, in Siberia, 87; *Mycosphaerella phaseolicola* (?) perithecial stage of, 88.
—, *Corticium centrifugum* on, in Siberia, 89.
[Soy-bean], *Erysiphe polygoni* on, in U.S.A., 19.
—, *Fusarium* on, in Russian Central Asia, 316; in Siberia, 88.
—, — *tracheiphilum* and *Gibberella* on, in Siberia, 88.
—, *Isariopsis griseola* on, in Siberia, 89.
—, (?) leaf curl of tobacco affecting, in Nyasaland, 806.
— mosaic in Czecho-Slovakia, 424.
—, *Mycosphaerella phaseolicola* on, in Siberia, 88; (?) perithecial stage of *Cercospora daizu*, 88.
—, *Olpidium trifolii* and *O. viciae* can infect, 720.
—, *Peronospora manshurica* on, in Russian Central Asia, 316; in Siberia, 87.
—, *Pleosphaerulina sojaecola* on, in Siberia, 88; ascigerous stage of *Phyllosticta sojaecola*, 88.
—, *Sclerotinia sclerotiorum* on, in Russian Central Asia, 316; in Siberia, 87.
—, *Septoria glycines* on, in Siberia, 88.
Spermophthora gossypii, systematic position of, 606.
Sphacelia on *Pennisetum typhoideum* in the Gold Coast and Sierra Leone, 97.
Sphaceloma on avocado pear in Jamaica, 625.
— *citri*, see *Sporotrichum citri*.
— *populi*, *Hadrotrichum populi* renamed, 724.
—, see also *Elsinoe*.
Sphacelotheca cruenta on sorghum in Tanganyika, 235.
— *sorghi* on sorghum, control, 103, 235, 449; occurrence in India, 103; in Tanganyika, 235; in U.S.A., 448; physiologic forms of, 448; varietal susceptibility to, 235.
Sphaerulcea ambigua, *Phymatotrichum omnivorum* on, in U.S.A., 370.
Sphaerella caricae synonym of *Mycosphaerella caricae*, 662.
Sphaeriaceae, species of, on coffee in Costa Rica, 369.
Sphaeropsis on apple in the Caucasus, 53.
— on lemon in Tanganyika, 697.
— *mori* on mulberry in Tanganyika, 698.
— *tumefaciens* on lime (?) in Dominica, 283; in Jamaica, 625.
— *ulmicola* renamed *Botryodiplodia ulmicola*, 212.
Sphaerosporangium referred to *Pythium*, 330, 546.
Sphaerostilbe musarum on banana in Jamaica, 25.
— *repens* on *Hevea* rubber, control, 2; occurrence in the Belgian Congo, 2; in Indo-China (from Sumatra), 432; in Malaya, 672.
— — on lime in Dominica, 283.
Sphaerotheca humuli on hops in England, 464.
— —, toxicity of various oils to, 253; of various sulphur compounds to, 732.
— *mors-uvae* on gooseberry in Germany, 799; in Ireland, 380.
— *pannosa* on rose, *Cicinnobolus cesatii*

parasitizing, 377; control, 28, 459, 680; factors affecting, 799; occurrence in England, 680; in Germany, 799; in Poland, 459; in U.S.A., 28, 377.
Sphaerulina eucalypti on *Eucalyptus* in S. Africa, 268.
Spicaria in a butter churn in U.S.A., 181.
(?) — on *Apate monacha* in the Ivory Coast, 241.
— *carnea* in soil in France, 325.
— *lateritia* on cacao in the Dominican Republic, 30.
— (*Isaria*) *swantoni* on bees in England, 241.
Spiders, *Acremonium griseum* and *Beauveria laxa* on, 179.
—, *Gibellula alata* on, in Ceylon, 574.
—, — *aranearum* on, in Ceylon, 574; in England, 299; in Europe and the West Indies, 573; synonymy of, 574; wrongly identified as *Isaria arachnophila*, 299.
—, *Hymenostilbe arachnophila* on, in England, 299; *Isaria arachnophila* renamed, 299.
—, *Oospora insectorum* on, 179.
Spike disease of sandalwood in India, 81, 336.
Spilanthes acmella, *Rhodochytrium spilanthidis* on, in Sumatra, 301.
Spinach (*Spinacia oleracea*), *Cladosporium macrocarpum* on, (?) in Holland, 767; in Hungary, 222.
—, (?) curly top of, in Italy, 766.
—, *Fusarium solani* on, in U.S.A., 28.
—, *Peronospora effusa* on, in U.S.A., 420.
—, *Pythium allantocladon*, *P. ascophallon*, and *P. teratosporon* on, in Hawaii, 546.
—, — *ultimum* on, in France, 344.
— yellows in Czecho-Slovakia, 258.
Spindle tuber of potato, control, 667; effect of, on yield, 667; histological effects of, 742; notes on, 596; occurrence in U.S.A., 596, 667, 742; transmission of, 667.
Spirechina pittieriana on *Rubus* in Guatemala, 606.
Spirogyra crassa, *Pythium angustatum* and *P. dictyosporum* on, in U.S.A., 605.
'Split leaf' of hops in England, 744.
Spondylocladium in a butter churn in U.S.A., 181.
— *atro-olivaceum* on man in Brazil, 242.
— *atrovirens* on potato in U.S.A., 670.
Spongospora subterranea on potato, effect of, on acidity of the tuber, 122; legislation against, in Brazil, 415; in Esthonia, 24; in Portugal, 272; note on, 226; occurrence in England, 122; in Kenya, 67; in Norway, 670; in Peru, 226.
Sporodesmium cladosporii on timber in Russia, 616.
— *putrefaciens* on beet in Germany, 147.
Sporonema oxycocci on cranberry in U.S.A., 188.
Sporormia on apple in U.S.A., 378.
Sporotrichum Beauveria peteloti stated to be a mixture of, with *Hirsutella saussurei*, 179.
[*Sporotrichum*] in a butter churn in U.S.A., 181.
— *beurmanni* on man (?) in U.S.A., 646; can infect carnation and rose, 647.
— *carnis* on meat in England, 199, 574.
— *carpogenum* on apple in U.S.A., 309.
— *citri* on grapefruit in Sierra Leone, 97.
— — on lemon in Jamaica, 25; in Sierra Leone, 97.
— — on orange, control, 25, 284, 625; occurrence in Dominica, 284; in Jamaica, 25, 625; in Trinidad, 283.
— *councilmani* on man (?) in U.S.A., 647; can infect carnation, 647.
— *gougeroti* on man in Porto Rico, 646, 647; can infect carnation, 647.
— *isariae* on *Isaria farinosa* in England, 241.
— *narcissi* renamed *Trichoderma narcissi*, 303.
— *persicae* on peach in Italy, 281.
— *poae* on carnation in U.S.A., 647.
— *pruinosum* in soil in U.S.A., 647; can infect carnation, 647.
— *radicicolum* renamed *Pachybasium bulbicolum*, 303.
'Spot' of *Solanum* in Mexico, 397.
— necrosis of tobacco, local lesions in, 334; occurrence in Rumania, 607; in U.S.A., 334; relation of, to healthy potato virus and tobacco veinbanding, 595; transmission of, by rubbing, 334.
— — of tomato, relation of, to healthy potato virus and tobacco veinbanding, 595.
Spotted wilt of tomato, control, 753; hosts of, 549, 609; occurrence in Australia, 549; in New S. Wales, 753; in S. Africa, 609; studies on, 549, 609; transmission of, by *Frankliniella*, 609; by *F. insularis*, 78, 549; by *Thrips tabaci*, 78, 550.
Sprain of potato in Norway, 670; in Rhodesia, 67; in Russia, 670.
— — —, hereditary, in Italy, 199.
Spray calendars for apple, cherry, peach, pear, plum, and vine in U.S.A., 654.
— injury, 113, 114, 152, 161, 185, 186, 380, 494, 520, 560, 561, 581, 661, 680, 684, 694, 765, 788.
— warning service against fruit and other diseases in New York, 729; against *Venturia inaequalis* on apple in U.S.A., 161.
Spraying apparatus, 247, 315, 523, 590, 655, 733.
— —, stationary, 196, 384, 385.
— nozzles, factors determining volume of spray from, 523.
— of trees, volume of liquid needed for, 522.
— versus dusting, see Dusting versus spraying.
Sprays, adhesiveness and wettability of, 153.
—, see also Fungicides.

Spruce (*Picea*), Basidiomycetes on, forming mycorrhiza in U.S.A., 527.
—, *Botrytis* on, in Ireland, 413.
—, *Chrysomyxa pyrolae* on, in Finland, 214.
—, — *rhododendri* on, in France, 553.
—, *Clitocybe diatreta* and *C. rivulosa* var. *angustifolia* on, forming mycorrhiza in U.S.A., 527.
—, *Corticium solani* on, in Ireland, 413.
—, *Ganoderma oregonense* on, in N. America, 615.
—, *Lycoperdon gemmatum* on, forming mycorrhiza in U.S.A., 527.
—, *Phacidium infestans* on, in Finland, 214.
—, *Polyporus schweinitzii* and *P. sulphureus* on, in Japan, 614.
—, *Rhizosphaera kalkhoffii* on, in Norway, 136.
—, *Thecopsora areolata* on, in France, 340.
—, *Trametes pini* on, in Japan, 614, 616; in N. America, 614.
—, *Tricholoma personatum* on, forming mycorrhiza in U.S.A., 527.
Squash (*Cucurbita*), *Pythium adhaerens* can infect, 605.
—, *Rhizopus arrhizus* can infect, 554.
—, (?) ring spot of tobacco affecting, in U.S.A., 132.
—, *Sclerotium rolfsii* on, in U.S.A., 349.
Squirter disease of banana in Queensland, 794.
Stachylidium theobromae on banana in Italian Somaliland, 765; in Trinidad, 312.
Stagonospora curtisii on *Narcissus* in U.S.A., 786.
— *fragariae* on strawberry in England, 423.
Stagonosporopsis trifolii, *Ascochyta trifolii* and *Phleospora trifolii* var. *recedens* synonyms of, 654; *P. trifolii* renamed, 654.
Staphylea trifolia, *Coryneum microstictum* var. *staphyleae* on, in U.S.A., 339.
Staphylococcus and its antivirus, effect of, on growth of *Achorion schonleini*, 516.
Stellaria media, restoration of virulence of beet curly top virus by passage through, 688.
Stem deterioration of sugar-cane in Mauritius, 127.
— disease of tea in India, 273.
— galls of sugar-cane in Cuba, 328; in Java, 604; in Mauritius, 265, 604; study on, 265; varietal susceptibility to, 328, 604.
— girdling of tea in Malaya, 768.
— rot of oil palm in Malaya, 769.
Stemphylium on cumin in Cyprus, 695.
—, saltation of, to *Alternaria*, 393.
— *maculans* on apple in Switzerland, 694.
— *solani* on tomato in U.S.A., 771.
Stereum gausapatum on oak in U.S.A., 497.
— *hirsutum* on timber, action of, 343.
— *purpureum* on *Acacia* in New Zealand, 247.
[*Stereum* (?) *purpureum*] on beech in Germany, 414.
— — on *Cytisus proliferus* and *C. scoparius* in New Zealand, 247.
— — on fruit trees in New Zealand, 247.
— — on lilac in Germany, 302.
— — on plum in England, 59.
— — on poplar and *Salix* in New Zealand, 247.
— —, tests of timber preservatives against, 84.
— *rameale* on oak in U.S.A., 497.
Sterigmatocystis ferruginea on *Attacus ricini*, 179.
—, see also *Aspergillus*.
'Sterility' of pigeon pea in India, 425, 427.
Sternbergia, virus disease of, in England, 591.
Sternol, toxicity of, to *Sphaerotheca humuli*, 253.
Stigmatea, phenology of, in Austria, 799.
Stilbella kervillei on (?) *Blepharoptera serrata* in England, 42.
Stipple streak of potato, see Streak.
Strawberry (*Fragaria vesca*), *Actinomyces* on, in U.S.A., 355.
—, Actinomycete on, in Holland, 250.
—, *Aphelenchus fragariae* on, in U.S.A., 380.
—, *Armillaria mellea* on, in U.S.A., 727.
—, *Bacillus amylovorus* can infect, 306.
—, *Botrytis* on, in Victoria, 380.
—, cauliflower disease of, 250, 380.
—, chlorosis of, 250.
—, *Corticium solani* on, in U.S.A., 661.
—, 'crepe leaf' of, in U.S.A., 771.
— crinkle in U.S.A., 792.
—, *Diplocarpon earliana* on, in U.S.A., 463.
— dwarf, notes on, 250, 380.
—, *Fusarium* on, in Canada, 251; in U.S.A., 771.
—, 'gold' disease of, in U.S.A., 496.
—, *Leptosphaeria coniothyrium* on, in Canada and U.S.A., 252.
—, mosaic-like disease of, in Canada, 252.
—, *Mycosphaerella fragariae* on, in U.S.A., 463; in Victoria, 379.
—, *Pezizella lythri* on, in Canada and U.S.A., 252; *Hainesia lythri* a stage of, 252.
—, *Phytophthora cactorum* on, in England, 559.
—, *Pythium* on, in Victoria, 380.
—, *Ramularia* on, in Canada, 251.
— red plant in Great Britain may be due to *Aphelenchus fragariae*, 380.
—, *Rhizoctonia* on, in Victoria, 380.
—, *Rhizopus nigricans* on, in U.S.A., 585; in Victoria, 380.
—, rots of, in transit in U.S.A., 585.
—, *Septoria fragariae* on, in England, 726.
—, small leaf of, note on, 250.
—, *Stagonospora fragariae* on, in England, 423.
—, stunt disease of, in U.S.A., 497.
—, *Verticillium albo-atrum* on, in U.S.A., 187, 727.

[Strawberry] wilt in U.S.A., 771.
— yellows, note on, 250; occurrence in U.S.A., 497.
Streak disease of *Cymbopogon citratus*, *Dactylotaenium aegyptiacum*, *Digitaria horizontalis*, *Diplachne eleusine*, and *Eleusine indica* in S. Africa, 67.
— — of maize, distinct from leaf stripe, 592; filtrability of virus of, 506; occurrence in S. Africa, 66, 591; in Tanganyika, 427, 591; relation of, to streak of *Digitaria horizontalis*, *Eleusine indica*, and sugar-cane, 66; transmission of, by *Cicadulina mbila*, 66, 592; by *C. zeae*, 592.
— — of peas in Hawaii and U.S.A., 218; relation of, to pineapple yellow spot, 218.
— — of potato, complex nature of, 394, 738; cytology of, 532; of infective *Myzus persicae*, 68; occurrence in Belgium, 121; in Czecho-Slovakia, 68; in England, 394; in Ireland, 532; in Portugal, 68; in Kenya, 67; in Rhodesia, 67; relation of, to potato crinkle, 740; to potato mosaic, 738; to tomato streak, 271; of *x* virus to, 394; of *y* virus to, 394, 738; of *z* virus to, 738; studies on, 394, 532; synonymy of, 740.
— — of raspberry in U.S.A., 381.
— — of *Rottboellia exaltata* and *Setaria verticillata* in S. Africa, 67.
— — of sugar-cane, effect of, on yield, 496, 603; occurrence in Mauritius, 127, 496; in S. Africa, 66, 540, 603; relation of, to streak of *Digitaria horizontalis* and *Eleusine indica*, 67; of maize, 66; varietal susceptibility to, 67, 540.
— — of tomato in U.S.A., 271; relation of, to cucumber mosaic, 6; to healthy potato virus, 271, 596; to potato mosaic, 679; to potato streak, 271; to tobacco mosaic, 271, 596; to tomato mosaic, 679. (See also Stripe.)
— — of *Tragus racemosus* in S. Africa, 67.
— necrosis of tobacco, complex nature of, 807.
Striga lutea, *Pythium ultimum* on, in S. Africa, 331.
Stripe disease of tomato, differences between 'streak' disease and, 679; occurrence in England, 679; in Germany and Holland, 10. (See also Streak.)
Stunt disease of strawberry in U.S.A., 497.
Stysanus, relation of, to *Microascus*, 6.
— *stemonites* on timber in Russia, 612.
— — on walnut in England, 80.
Sub-crinkle of potato in Ireland, 740.
Sublimatformalin, use of, against *Ustilago avenae* on oats, 568.
Sudan grass (*Andropogon sorghum* var. *sudanensis*), *Bacillus sorghi* on, *Bacterium holci* may be mistaken for, in S. Europe, 364; occurrence in Hungary, 222.
— —, *Bacterium holci* on, in Bulgaria, 364.
[Sudan grass], mosaic of, note on, 406.
— —, *Phytomonas rubrilineans* can infect, 473.
Sugar, effect of, on toxicity of copper sulphate to *Cladosporium*, 636.
Sugar-cane (*Saccharum officinale*), *Bacillus sacchari* on, in the Philippines, 203.
—, bacteria on, associated with top rot, in Indo-China, 432.
—, *Bacterium albilineans* on, control, 328; notes on, 327, 539; occurrence in Hawaii, 328, 539; in Mauritius, 127, 495, 604; in the Philippines, 203; in Queensland, 327; varietal susceptibility to, 604.
—, — *vascularum* on, breeding against, 541; control, 204, 804; diagnosis of, 542; effect of, on yield, 75; occurrence in Australia, 542; in Barbados, 75, 804; in Mauritius, 127, 495; in New S. Wales, 541; in Porto Rico, 542; in Queensland, 204, 327; in St. Lucia, 698; strains of, 542; varietal resistance to, 75, 327, 541, 698, 804.
—, 'bunch-top' of, see 'Stem galls' of.
—, *Cephalosporium sacchari* on, in the Argentine, 562; in the Philippines, 203.
—, *Ceratostomella paradoxa* on, control, 542; notes on, 542; occurrence in Mauritius, 127, in the Philippines, 203; in Porto Rico, 542.
—, *Cercospora kopkei* on, in Java, 205; in the Philippines, 203, 205.
—, — *longipes* on, in Mauritius, 127.
—, chlorotic streak disease of, in Hawaii, 4, 540, 674; similarity of, to the Java 'fourth disease', 4.
—, *Colletotrichum falcatum* on, in Indo-China, 432; in Mauritius, 127; in the Philippines, 203, 204; in U.S.A., 75, 543; varietal susceptibility to, 75, 205, 543.
—, *Coniothyrium sacchari* on, in Indo-China, 432.
—, *Corticium solani* on, in the Philippines, 203.
—, decay of seed pieces of, in the Philippines, 5.
—, *Dictyophora multicolor* on, in Madagascar, 128.
— diseases, dissemination of, 674; in Porto Rico, 128; quarantine against, in S. Africa, 264; methods of, 403; world distribution of principal, 674.
— dwarf in Queensland, 326, 472.
—, Fiji disease of, in New S. Wales, 541; in the Philippines, 203; in Queensland, 327; transmission of (?) by *Trionymus sacchari*, 327; varietal susceptibility to, 541.
—, *Fusarium* on, as the cause of pokkah boeng, 266, 403; occurrence in the Philippines, 266, 403; in U.S.A., 543; varietal susceptibility to, 543.
—, *Gibberella fujikuroi* on, in Japan, 332.
—, — *moniliformis* on (?) in Cuba, 327; in Hawaii, 674; (?) in India, 425; in Indo-China, 432; in the Philip-

pines, 203; varietal susceptibility to, 327. (See also Pokkah boeng of.)
[Sugar-cane], *Helminthosporium nodulosum* can infect, 426.
—, — *ocellum* on, factors affecting, 4; occurrence in Cuba, 327; in Hawaii, 4, 674; in Mauritius, 127; varietal resistance to, 4, 327.
—, — *sacchari* on, in the Philippines, 203.
—, — *stenospilum* on, factors affecting, 540; occurrence in Cuba, 327; in Hawaii, 4, 540; *Ophiobolus* ascigerous stage of, 4; varietal susceptibility to, 327.
—, *Leptosphaeria sacchari* on, in Mauritius, 127; in the Philippines, 203.
—, *Marasmius sacchari* on, in Porto Rico, 674.
—, *Melanconium sacchari* on, in Porto Rico and U.S.A., 543.
— mosaic, breeding against, 265, 540; control, 128, 425, 541; Dominican pamphlet on, 74; effect of, on opacity and thickness of leaves, 541; on yield, 603; legislation against, in Peru, 225; notes on, 25, 223, 225; occurrence in the Argentine, 128; in Cuba, 327, 603; in Hawaii, 539; in India, 223, 425; in Jamaica, 25, 625; in New Guinea, 265; in Peru, 225; in the Philippines, 203; in Porto Rico, 540, 804; in S. Africa, 540, 541; in Trinidad, 283; in U.S.A., 265; rate of spread of, 540; studies on, 265, 603; varietal resistance to, 25, 265, 327, 425, 540, 541, 603, 625, 804.
—, Pahala blight of, in Hawaii, 328.
—, *Phytomonas rubrilineans* on, control, 328; losses caused by, 542; occurrence in Cuba, 327; in Hawaii, 328, 674; in Kenya, 159; in Queensland, 473, 542; study on, 473; varietal susceptibility to, 327.
—, — *rubrisubalbicans* on, in Queensland and U.S.A., 473.
—, pokkah boeng of, etiology of, 4, 266, 332, 403; occurrence in Hawaii, 4; in Japan, 332; in the Philippines, 266, 403. (See also *Gibberella moniliformis* on.)
—, *Puccinia kuehnii* on, in the Philippines, 203.
—, *Pythium* on, in the Philippines, 5, 203.
—, — *aphanidermatum* on, in Hawaii, 4, 540.
—, — *arrhenomanes* var. *philippinensis* can infect, 778.
—, red stripe disease of, in Hawaii, distinct from that due to *Phytomonas rubrilineans*, 4.
—, root disease of, breeding against, 540; occurrence in Cuba, 327; in Mauritius, 127; in Porto Rico, 540; in Trinidad, 283; varietal resistance to, 540.
—, *Sclerospora sacchari* on, 403; in India, 425.
—, *Sclerotium* on, in Indo-China, 432.
[Sugar-cane, *Sclerotium*] *rolfsii* on, control, 432, 547; occurrence in Indo-China, 432; in Jamaica, 547; (?) in the Philippines, 203.
—, stem deterioration of, in Mauritius, 127.
—, — galls of, in Cuba, 328; in Java, 604; in Mauritius, 265, 604; study on, 265; varietal susceptibility to, 328, 604.
— streak, effect of, on yield, 496, 603; occurrence in Mauritius, 127, 496; in S. Africa, 66, 540, 603; relation of, to streak of *Digitaria horizontalis* and *Eleusine indica*, 67; of maize, 66; varietal susceptibility to, 67, 540.
—, tangled top of, see twisted top of.
—, top rot of, in Indo-China, 432; in Mauritius, 127.
—, twisted top of, in Peru, 225; in the Philippines, 266.
—, *Ustilago scitaminea* on, in Indo-China, 432; in Mauritius, 127; in the Philippines, 203; varietal susceptibility to, 432.
Sulfinette, use of, against *Venturia pirina* on pear, 494.
Sulfocide, use of, against *Venturia inaequalis* on apple, 161.
Sulfurator apparatus, 469, 470.
Sulphite lye as a spreader, 465.
Sulpho-tone, toxicity of, to *Sclerotinia americana*, 385.
Sulphur, atomic, analysis of, 587.
—, atomized, use of, against *Podosphaera leucotricha* on apple, 519.
—, Bentonite, see Bentonite sulphur.
— -celestina, use of, against *Pestalozzia guepini* on *Rhododendron indicum*, 650.
—, colloidal, see Colloidal sulphur.
—, crude, use of, as a fungicide; 731.
— deficiency as the cause of tea yellows in Nyasaland, 427, 805.
— — of tobacco in Nyasaland, 805.
— dioxide, role of, in the fungicidal action of sulphur, 465.
— —, use of, against *Cladosporium cucumerinum* on cucumber, 691; against *C. fulvum* on tomato, 211; against timber-rotting fungi, 83.
—, dritomic, toxicity of, to *Sclerotinia americana*, 385.
—, —, use of, against *Podosphaera leucotricha* on apple, 519.
— dusts, 'angle of slope' as a measure of dusting qualities of, 386.
— —, cost of treatment with, 282, 672; of seed treatment with, 104.
— —, particle size of, 195, 386.
— —, physical factors affecting efficiency of, 385.
— —, use of, against *Erysiphe cichoracearum* on cantaloupe, 28; against *E. graminis* on wheat, 32; against *E. polygoni* on melon, 94; against fruit diseases, 582; against *Kuehneola fici* on fig, 282; against *Microsphaera quercina* on oak, 682; against *Oidium* on cumin, 282; against *O. heveae* on *Hevea* rubber, 126, 401, 470, 672; against

Phytophthora infestans on potato, 494; against *Pseudoperonospora cubensis* on cantaloupe, 28; against *Puccinia* on cereals, 286; against *P. graminis* on wheat, 32, 286; against *P. triticina* on wheat, 32, 196, 286, 440; against *Sphacelotheca sorghi* on sorghum, 103; against *Sphaerotheca mors-uvae* on gooseberry, 380; against *Uncinula necator* on vine, 221, 622; against *Uromyces caryophyllinus* on carnation, 28; against *Venturia inaequalis* on apple, 49.

[Sulphur], effect of soil applications of, on *Erysiphe cichoracearum* on cantaloupe, 28; on *Ganoderma pseudoferreum* on tea, 131; on H-ion concentration of soil, 131; on Pahala blight of sugar-cane, 328; on *Pseudoperonospora cubensis* on cantaloupe, 28; on *Rosellinia necatrix* on fruit trees, 110; on tea yellows, 806; on *Thielavia basicola* on tobacco, 496.

—, 'flotate', use of, against *Oidium heveae* on *Hevea* rubber, 802.

—, flotation, injury, 561.

—, —, use of, against *Phyllosticta solitaria* on apple, 520; against *Taphrina deformans* on peach, 519; against *Venturia inaequalis* on apple, 427, 520, 626, 788.

— fumigation, use of, against *Cladosporium fulvum* on tomato, 211, 680; against *Mycogone perniciosa* on mushrooms, 493.

—, fungicidal action of, 195, 465, 730, 731, 733.

— injury, 28, 94, 380, 421.

—, inoculated, use of, against *Phytophthora cinnamomi* on *Rhododendron*, 627.

— lime, dry mix, use of, against *Gloeodes pomigena* on apple, 560; against orchard diseases, 655; against *Venturia inaequalis* on apple, 788.

— -lime-sulphur, sulphur-manganar, and 'sulphur mist' dusts, use of, against *Venturia inaequalis* on apple, 427.

—,.pentathionic acid as the fungicidal agent of, 196, 465.

—, production of sulphuretted hydrogen from, by fungi. 465, 731; by higher plants, 196, 465; by *Oidium heveae*, 802.

—, products of hydrolysis of, fungicidal properties of, 731.

—, Romagna M.S.R., and S.A.I.M., composition of, and efficacy of, 195.

'— smoke', use of, against *Cercospora kopkei* on sugar-cane, 205.

—, sulphuretted hydrogen as the fungicidal agent of, 196, 465, 731.

—, vaporization of, 465.

— vaporizing apparatus, 211, 254, 469, 470.

—, ventilated, use of, against *Microsphaera quercina* on oak, 682.

—, wettable, use of, against *Bacterium pruni* on peach, 661; against *Venturia inaequalis* on apple, 520.

Sulphuretted hydrogen, production of, from sulphur, by fungi, 465, 731; by higher plants, 196, 465; by *Oidium heveae*, 802.

[Sulphuretted hydrogen], role of, in the fungicidal action of sulphur, 196, 465, 731.

— —, toxicity of, to fungi, 465, 730, 732.

Sulphuric acid, toxicity of, to *Erysiphe graminis*, 730; to micro-organisms, 466.

— —, use of, against *Botrytis* and *Corticium solani* on *Pseudotsuga taxifolia* and spruce, 413; against *B. cinerea* on vine, 623; against *Cercospora beticola* on beet, 348; against *Gloeosporium ampelophagum* on vine, 352; against *Phytophthora parasitica nicotianae* on tobacco, 750.

Sulsol, analytical evaluation of, 194, 587.

Sun blotch of avocado pear in U.S.A., 314.

— scald of chilli in U.S.A., 804.

— scorch of plum in S. Africa, 521.

Sunflower (*Helianthus annuus*), bacterial leaf spot of, in Russia, 282.

—, *Macrophomina phaseoli* can infect, 224.

—, *Pythium splendens* var. *hawaiianum* on, in Hawaii, 546.

—, *Rhizopus nigricans* on, in Russia, 282.

—, *Sclerotinia sclerotiorum* on, in Russia, 652; in Siberia, 87.

Sunoxol, use of, against *Plasmopara viticola* on vine, 622.

Swedes (*Brassica campestris*), *Phoma lingam* on, in Denmark, 489; in Wales, 345.

—, *Plasmodiophora brassicae* on, in Canada, 276; in Scotland, 759.

—, reclamation disease of, in Denmark, 767.

—, *Rhizopus arrhizus* can infect, 554.

—, — *fusiformis* on, in U.S.A., 554.

Sweet clover, see *Melilotus*.

Sweet peas (*Lathyrus odoratus*), diseases of, in U.S.A., 649.

— —, *Erysiphe polygoni* on, in U.S.A., 224.

— —, *Mycosphaerella pinodes* on, in England and Wales, 423.

Sweet potato (*Ipomoea batatas*), (?) *Actinomyces, Ceratostomella fimbriata*, (?) *Cystospora batata, Diaporthe batatatis, Diplodia tubericola, Fusarium batatatis, F. hyperoxysporum*, and *F. oxysporum* on, in U.S.A., 535.

— —, *Monilochaetes infuscans* on, in U.S.A., 535, 626.

— — mosaic in U.S.A., 535.

— —, *Mucor abundans* can infect, 554.

— —, *Plenodomus destruens* on, in U.S.A., 535.

— —, *Pythium aphanidermatum* on, in S. Africa, 331.

— —, — *splendens* var. *hawaiianum* on, in Hawaii, 546.

— —, — *ultimum* on, in S. Africa, 331.

— —, *Rhizopus arrhizus* can infect, 554.

— —, — *nigricans* on, in U.S.A., 535.

— —, — — var. *minor* on, in U.S.A., 554.

[Sweet potato], *Sclerotium rolfsii* on, in Jamaica, 547; in U.S.A., 535.
— —, tuber diseases of, in U.S.A., 598.
(?) Symbiosis of various seed fungi and *Fritillaria*, lily, and tulip in Italy, 387.
—, see also Mycorrhiza.
Syncephalastrum (?) *cinereum* on copra in England, 175.
Synchytrium endobioticum on potato, control, 71, 321, 468; cytology of, 123, 261; effect of, on acidity of the tubers, 122; on yield, 322; factors affecting, 70; genetics of resistance to, 669; legislation against, in Brazil, 415; in the British Isles, 543; in Dutch E. Indies, 608; in Esthonia, 24; in Germany, 597; in Jugo-Slavia, 272; in Portugal, 272; in Spain, 752; method of testing immunity from, 70, 744; monograph on, 321; notes on, 70, 71, 495; occurrence in Austria, 321; in Belgium, 123; in Denmark, 768; in England, 122, 321; in Germany, 65, 69, 70, 261, 321, 597; in Norway, 669; in Peru, 226; in Poland, 743; not in Russia, 70; in Sweden, 533; in Switzerland, 120, 468, 495; studies on, 69, 261, 321, 533, 669; varietal resistance to, 69, 71, 120, 468, 533, 669, 743.
— *trifolii* identical with *Olpidium trifolii*, 721.
— *vaccinii* on cranberry in U.S.A., 188.
Synedrella nodiflora, (?) tobacco 'kroepoek' affecting, in Java, 479.
Syringa vulgaris, see Lilac.

Tangerine, see Orange.
Tangled top of sugar-cane, see Twisted top of.
Tannin, toxicity of, to *Armillaria mellea*, 681.
Taphrina acerina on *Acer platanoides* in Norway, 137.
— *cerasi* on cherry in Czecho-Slovakia, 424.
— *deformans* on peach, control, 187, 519, 520; factors affecting, 799; occurrence in Austria, 799; in Germany, 187; in U.S.A., 519, 520.
— *insititiae* on plum in Czecho-Slovakia, 424.
Tar, toxicity of, to wood-destroying fungi, 14.
—, use of, against *Ceratostomella paradoxa* on sugar-cane, 542; as a wound dressing, 613, 660.
—, see also Creosote, Coal tar.
— distillate wash, use of, against *Botryodiplodia theobromae* and *Phytophthora palmivora* on cacao, 26.
— emulsions, use of, against *Phytophthora* on *Hevea* rubber, 802.
— oils, fungicidal properties of, 253.
(?) *Tarsonemus floricolus* in fungus cultures, control, 118.
Tartaric acid, effect of, on keeping quality of Burgundy mixture, 429.
Tea (*Thea*), 'bitten off' disease of, in Ceylon, 749.
[Tea], *Botryodiplodia theobromae* on, in Malaya, 768.
—, collar rot of, in Malaya, 769.
—, *Corticium salmonicolor* on, in Malaya, 768.
— diseases, legislation against, in S. Africa, 208.
—, *Exobasidium vexans* on, in Indo-China, 433.
—, *Fomes lignosus* on, in Malaya, 768.
'— fungus', use of, for making a beverage in Java, 548, 676.
—, *Ganoderma pseudoferreum* on, in Java, 131.
—, 'lightning strike' of, in Ceylon, 749.
—, *Macrophomina phaseoli* on, in Nyasaland, 805.
—, *Microxyphium purpurascens* and *M. theae* on, in Java, 404.
—, *Poria hypolateritia* on, in Ceylon, 749.
—, 'scabbed leaf' of, in Indo-China, 433.
—, stem disease of, in India, 273.
—, — girdling of, in Malaya, 768.
—, witches' broom of, in Ceylon, 749.
— yellows (sulphur deficiency disease) in Nyasaland, 427, 805.
Tecoma radicans, (?) yellows of peach affecting, in U.S.A., 521.
Tephrosia candida, diseases of, in Ceylon, 601.
Terbolan, use of, against *Phytophthora parasitica nicotianae* on tobacco, 750.
Termites, (?) transmission of cassava mosaic by, in the French Cameroons, 152.
Tetracuprite dust, composition of, and use of, against vine diseases, 154.
Tetragonia expansa, *Puccinia tetragoniae* on, in S. Africa, 268.
Tetranychus telarius in relation to 'plume' disease of peach in Italy, 462.
— — transmitting tomato mosaic in U.S.A., 531.
Tettigoniella spectra, *Metarrhizium album* on, 179.
Thalictrum dipterocarpon and *T. flavum*, *Puccinia triticina* can infect, 629.
Thallium poisoning as the probable cause of tobacco frenching in U.S.A., 807.
Thamnidium chaetocladioides and *T. elegans* on meat, effect of carbon dioxide on, 574.
Thanalith U, composition of, and use of, as a timber preservative, 85.
Thea, see Tea.
Thecopsora areolata on *Prunus padus* and spruce in France, 340.
Thelephora tenuis in Eastern Asia and Siberia, 268.
Thelephoraceae, Russian species of, 76.
Thevetia neriifolia, *Corticium solani* on, in Sierra Leone, 97.
Thielavia basicola causing black root of tobacco, see *Thielaviopsis basicola*.
— — on peas in England, 623.
Thielaviopsis basicola on tobacco, breeding against, 7; control, 76, 496, 677; occurrence in Canada, 138; in Porto

Rico, 677; in Queensland, 76; in U.S.A., 7. 496; varietal resistance to, 7, 133, 677.
Thionosperit, use of, against *Cercospora beticola* on beet, 348.
Thisol, use of, against *Cladosporium fulvum* on tomato, 680.
Thrips, (?) transmission of a virus disease of narcissus by, in England, 591.
—, see also *Frankliniella*.
— *bremneri*, transmission of fig diseases by, in U.S.A., 522.
— *tabaci*, transmission of pineapple yellow spot by, in Hawaii, 78, 116, 191, 218, 586; of streak of peas by, in Hawaii, 218; of tomato mosaic by, in U.S.A., 531; of tomato spotted wilt by, in Australia, 78, 550.
Thuja, *Pestalozzia funerea* on, in U.S.A., 377.
—, (?) *Phomopsis juniperovora* on, in Holland, 96.
— *gigantea*, *Didymascella thujina* on, in Holland, 96.
— *lobbii*, *Didymascella thujina* on, in England, 22.
— *plicata*, *Poria weirii* on, (?) in Canada, 615; in U.S.A., 140.
Thujopsis dolabrata, see Hiba wood.
Thylox sulphur, use of, against *Venturia inaequalis* on apple, 520.
Thymol, use of, against *Cladosporium fulvum* on tomato, 211.
Thyrospora sarcinaeforme sensu Tehon & Daniels distinct from *Macrosporium sarcinaeforme*, 377.
Tilachlidium in a butter churn in U.S.A., 181.
— *larvarum* on a micro-lepidopteron, 179.
Tilia, see Lime tree.
Tillantin dust, effect of, on germination of wheat, 169; after storage, 567.
— C, estimation of mercury in, 314.
— —, use of, against *Pleospora graminea* on barley, wheat bunt, and *Urocystis occulta* on rye, 162.
— R, factors affecting germination of seed-grain treated with, 773.
— —, use of, against *Colletotrichum lindemuthianum* on bean, 687; against *Diplodia zeae* on maize, 778; against *Pseudomonas campestris* on cabbage, 687; against various diseases of vegetables, 687.
Tilletia asperifolia, method of culturing, 289.
— *caries* can infect *Aegilops ventricosa*, 360; rye, 501.
— — on wheat, action of mercury salts on spores of, 501; breeding against, 360; control, 35, 100, 162, 232, 289, 290, 442, 443, 502, 503, 566, 706, 707; effect of, on adhesiveness of seed dusts, 442; on plant growth, 22, 502, 565, 631; of sowing date on, 705, 706; of wounding on susceptibility to, 630; experimental production of leaf galls by, 705; factors affecting, 289, 564, 624, 630, 631, 705, 706; genetics of resistance to, 33, 100, 360, 500; heterothallism in, 440; hybridization of, with *T. foetens*, 440, 706; losses caused by, 232; methods of culturing and inoculating, 289; notes on, 22, 443; occurrence in Canada, 289, 293, 360; in Czecho-Slovakia, 157, 624; in Denmark, 162; in England, 35, 500; in France, 22, 100, 442, 566; in Germany, 65, 502, 503, 564, 707; in Hungary, 501; in Italy, 630, 631; in Lithuania, 566; in New S. Wales, 99; in Palestine, 35, 361; in Poland, 706; in Rumania, 156; in Russia, 35, 290; in S. Europe, 442; in Tunis, 442, 443; in U.S.A., 33, 162, 232, 440, 500, 502, 565, 705, 706; physiologic forms of, 33, 35, 360, 440, 500, 565, 705; seed certification against, in Germany, 65; strains of, 565; studies on, 360, 442, 500, 564, 565, 630, 705; varietal resistance to, 33, 34, 35, 360, 442, 500, 630, 705.
[*Tilletia*] *foetens* on wheat, breeding against, 360; control, 35, 100, 232, 289, 290, 442, 443, 502, 566, 706, 707; effect of, on adhesiveness of seed dusts, 442; on plant growth, 22, 502, 565, 631; of sowing date on, 705, 706; of wounding on susceptibility to, 630; experimental production of leaf galls by, 705; factors affecting, 289, 565, 630, 705; genetics of resistance to, 33, 360; heterothallism in, 440; hybridization of, with *T. caries*, 441, 706; losses caused by, 156, 232; method of culturing, 169, 289; of inoculating, 289; notes on, 22, 443; occurrence in Canada, 289, 293, 360; in France, 22, 100, 442, 566; in Germany, 65, 502, 565, 707; in Italy, 630, 631; in Rumania, 156; in Russia, 35, 290; in Tunis, 442, 443; in U.S.A., 33, 232, 440, 499, 502, 565, 705, 706; physiologic forms of, 33, 360, 440, 499, 565, 705; seed certification against, in Germany, 65; studies on, 360, 442, 564, 565, 630, 705; trimethylamine in spores of, 775; varietal resistance to, 33, 360, 442, 565, 630.
— *holci*, method of culturing, 289.
— — on *Holcus lanatus* in Denmark, 304.
— *horrida*, method of culturing, 289.
— — on rice in China, 324.
— *indica* on wheat in India, 425.
— *secalis* on rye in Czecho-Slovakia, 233.
Timber, *Aposphaeria petersii* and *A. pinea* on, in Russia, 616.
—, *Armillaria mellea* on, action of, 343.
—, *Aspergillus* on, in S. Africa, 684.
—, *Bispora effusa* on, in S. Africa, 684.
—, — *monilioides* on, in Russia, 612.
—, *Bulgaria polymorpha* on, in Russia, 612.
—, *Cadophora fastigiata* on, in Canada and U.S.A., 14.
—, *Ceratostomella* on, in Queensland, 216.
—, — *buxi* on, in Russia, 616.
—, — *castaneae* on, in Russia, 616, 681.
—, — *coerulea*, *C. piceae*, *C. pini*, and

Cladosporium herbarum on, in Russia, 616.
[Timber], *Coniophora cerebella* on, control, 83, 415; factors affecting, 414; occurrence in England, 274; in Germany, 414; in Russia, 83.
—, — *sibirica* on, in Eastern Asia and Siberia, 268.
—, *Coniothyrium dispersellum* on, in Russia, 616.
— decay, chemistry of, 815; factors affecting, 487.
—, *Fomes laricis* on, in Canada, 614.
—, — *pachyphloeus* on, in the Philippines, 613.
—, — *pinicola* on, in Canada, 614.
—, — *roseus* on, factors affecting, 488.
—, fungi destroying, in Canada, 614; in Great Britain, 814; Russian books on, 78, 83; type cultures of, in England, 488.
—, *Fusarium* on, in S. Africa, 684.
—, *Ganoderma applanatum* on, in Malaya, 105.
—, *Hormiscium antiquum* and *Hormonema dematioides* on, in Russia, 616.
—, *Lasiosphaeria hispida* on, in Russia, 612.
—, — *spermoides* on, in Russia, 616.
—, *Lentinus lepideus* on, in Czecho-Slovakia, 341.
—, — *squamosus* var. *suffrutescens* on, in Czecho-Slovakia, 341.
—, *Lenzites striata* on, in the Philippines, 218.
—, *Ligniella pinicola* on, in Russia, 616.
—, *Merulius lacrymans* on, control, 83, 84, 217, 415, 487; experimental house for the study of, 487; factors affecting, 217, 343, 414; note on, 487; occurrence in Denmark, 83; in England, 274, 343; in France, 217; in Germany, 84, 414; in Russia, 83.
—, moulding of, in U.S.A., 816.
—, *Paxillus panuoides* on, in England, 274, 488.
—, *Phellinus cryptarum* on, in England, 423.
—, *Polyporus hispidus* on, action of, 343.
—, *Polystictus* on, in Germany, 343.
—, — *cinnabarinus* and *P. hirsutus* on, in U.S.A., 275.
—, — *sanguineus* on, in the Philippines, 218.
—, — *versicolor* on, action of, 343.
—, *Poria subacida* on, in U.S.A., 552.
—, — *vaporaria* on, control, 83, 84; occurrence in England, 274; in Germany, 84; in Russia, 83.
— preservation by the Boucherie, Boulton, Card, Lowrie, Rueping, and other processes, 815; by the 'Falkamesam' process, 216, 685; by the Kyanization process, 15, 16; by the open tank process, 488; by the Powellizing process, 686.
— —, chemical objective in, 815.
— —, costs of, method of estimating, 617, 685.
— —, factors affecting, 487.
[Timber preservation] in Australia, 617; in Britain, 487, 815; in Germany, 85, 554; in India, 145, 488, 685; in U.S.A., 685.
— —, underlying principles of, 413.
— —, use of coal tar derivatives for, 85; of chromium, copper sulphate, creosote, dinitrocresol, and fluorides for, 815; of mercuric chloride for, 15, 16, 85, 815; of salicylic acid and silicofluorides for, 815; of sodium fluoride for, 85, 554; of thanalith U for, 85; of zinc chloride for, 85, 815.
— preservatives, methods of testing efficacy of, 14, 83, 145, 216, 413, 487, 757.
— —, use of *Coniophora cerebella*, *Fomes annosus*, *Lentinus lepideus*, and *Polystictus versicolor* in tests of, 487.
—, *Rosellinia abietina* var. *trichota* on, in Russia, 616.
—, — *ambigua* on, in Russia, 612.
—, — *pulveracea* on, in Russia, 612, 616.
—, sap-stain of, in Canada, 615; in U.S.A., 733, 816.
—, *Sirodesmium granulosum* and *Sporodesmium cladosporii* on, in Russia, 616.
—, *Stereum hirsutum* on, action of, 343.
—, *Stysanus stemonites* on, in Russia, 612.
—, *Trametes serialis* on, action of, 342.
—, — *versatilis* on, in the Philippines, 218.
—, *Trematosphaeria hydrella* on, in Russia, 612.
—, *Trichosporium lignicolum* on, in Russia, 616.
—, — *tingens* on, in Russia, 617.
Tineidae, *Beauveria laxa* on, 179.
Tithonia diversifolia, virus disease of, in S. Africa, 427.
Tobacco (*Nicotiana*), *Alternaria* on, in India, 426.
—, — *longipes* on, in Rhodesia, 207.
—, — *tabacina* on, in Hungary, 135; (?) in Rhodesia, 135, 207; in Rumania, 156; *A. brassicae* var. *tabaci* (?) identical with, 156.
—, — *tenuis* on, in U.S.A., 135.
—, *Bacillus aroideae* on, in Sumatra, 478; (?) in U.S.A., 209.
—, *Bacterium pseudozoogloeae* on, in Italy, 677, 766.
—, — *solanacearum* on, breeding against, 477; notes on, 332; occurrence in Ceylon, 223; in Malaya, 769; in S. Africa, 123; in Sumatra, 332, 477; strain of, non-pathogenic to, 29.
—, — *tabacum* on, control, 497, 807; factors affecting, 77; histological effects of, 480; occurrence in France, 807; (?) in Russia, 77; in U.S.A., 497; studies on, 77, 807.
—, *Botryodiplodia theobromae* on, in Sumatra, 478.
—, *Botrytis cinerea* on, in Guatemala, 431; (?) in U.S.A., 133.
—, — *verrucosa* on, in Sumatra, 478.
—, brown root rot of, in U.S.A., 9, 496.
—, cabbaging of, see leaf curl of.
—, *Cercospora nicotianae* on, control, 76,

134, 677 ; factors affecting, 477 ; losses caused by, 677 ; note on, 129 ; occurrence in Guatemala, 431 ; in Malaya, 769 ; in Porto Rico, 677 ; in Queensland, 76 ; in Rhodesia, 677 ; in Sumatra, 134, 477 ; study on, 134.
[Tobacco, *Cercospora*] *raciborskii* on, in Hawaii, 129.
—, *Colletotrichum* on, causing 'stem and rib scorch' in Germany, 753.
—, 'corcovo' of, in the Argentine, 269.
—, crinkle, crinkling, and crinkly dwarf of, see leaf curl of.
—, cucumber mosaic on, 406 ; in U.S.A., 6, 334.
—, curly leaf of, in S. Africa, 76.
—, *Didymella lycopersici* can infect, 809.
— diseases in Canada, 96 ; in U.S.A., 132.
—, *Erysiphe cichoracearum* on, control, 333 ; occurrence in Guatemala, 431 ; in Java, 333 ; in Rhodesia, 677.
—, 'Faltenzwerg' of, (?) identical with 'kroepoek', 478.
— frenching in S. Rhodesia confused with leaf curl, 676 ; in U.S.A., 7, 807 ; thallium toxicity in relation to, 807.
—, *Fusarium culmorum* on, in Bulgaria, 745.
—, 'gilah' of, (?) identical with 'kroepoek', 478.
—, *Glomerella lycopersici* on, in Sumatra, 478.
—, 'korab' of, in Sumatra, 333, 478 ; identical with 'pock' disease, 333.
—, 'kroepoek' of, see leaf curl of.
—, 'krulziekte' of, in Java, a type of 'kroepoek', 478.
—, leaf curl of, control, 676, 806 ; notes on, 76, 333 ; occurrence in E. Africa, 676 ; in Java, 333, 478, 676 ; in Nyasaland, 676, 806 ; in Rhodesia, 676 ; in S. Africa, 76, 676 ; in Tanganyika, 76 ; studies on, 478, 676 ; synonymy of, 478, 676 ; transmission of, by Aleyrodidae, 76, 479, 806 ; by *Bemisia* (?) *gossypiperda*, 479, 676 ; by grafts, 76, 479 ; to *Nicotiana* spp. and tomato, 479 ; types of, 478 ; virus of, affecting *Synedrella nodiflora* and *Zinnia elegans*, 479 ; *Vernonia*, 676, 806 ; (?) various hosts, 806.
—, (?) *Macrophomina phaseoli* on, in India, 104.
—, manganese excess disease of, in U.S.A., 548.
— mosaic, control, 76 ; cytology of, 7, 8, 796 ; effect of enzymes on virus of, 334 ; of, on physiology of host, 592 ; factors affecting, 256, 806 ; iodine staining in study of, 333, 334 ; leaf spot symptoms of, 7 ; local lesions in, 333, 334 ; nature of virus of, 256, 334, 592, 751 ; nitrogen content of virus of, 406 ; occurrence in the Argentine, 269 ; in Germany, 256 ; in Java, 750 ; in Nyasaland, 806 ; in Porto Rico, 7, 8, 677 ; in Queensland, 76 ; in Rumania, 607 ; in Sweden, 592 ; in U.S.A., 6, 7, 271, 333, 334, 406, 407, 595 ; purification of virus of, 406, 407 ; relation of, to 'corcovo' and 'polvillo', 270 ; to healthy potato virus, 271 ; to potato rugose mosaic, 595 ; to tobacco leaf necrosis, 596 ; to tomato mosaic, 271, 808 ; to tomato streak, 271, 596 ; to tomato virus disease, 808 ; size of virus particles of, 256, 407, 735 ; specificity of precipitin reaction to virus of, 406 ; spread of virus of, in tobacco and tomato tissues, 207 ; studies on, 7, 8, 256, 333, 334, 592, 750 ; transmission of, 334 ; to beans, 6 ; to *Nicotiana glauca*, 256 ; to pepper and tomatoes, 8 ; to *Pelargonium zonale*, 650 ; types of, 735, 750 ; undescribed symptoms of, 8 ; virus of, affecting weeds in U.S.A., 7.
[Tobacco], 'peh-sim' of, in Sumatra, 477.
—, *Peronospora* on, control, 9, 76, 209, 408, 607 ; notes on, 9 ; occurrence in Australia, 209 ; in Queensland, 76 ; in Victoria, 408 ; in Western Australia, 9, 607 ; viability of, 198, 209.
—, — *hyoscyami* on, notes on, 9 ; occurrence in the Ukraine, 156 ; in U.S.A., 9, 806.
—, *Phyllosticta* on, in Nyasaland, 806.
—, — *nicotiana* on, in Rhodesia, 206.
—, — *tabaci* on, in Rhodesia, 206 ; in Rumania, 756.
—, *Phytophthora* on, in Mauritius, 496.
—, — *parasitica* var. *macrospora* on, in France, 23.
—, — — *nicotianae* on, breeding against, 407, 806 ; control, 333, 677, 750 ; occurrence in Guatemala, 431 ; in Java, 333, 750 ; in Porto Rico, 677 ; in Rumania, 156 ; in Sumatra, 333 ; in U.S.A., 407, 806 ; studies on, 407, 750 ; varietal resistance to, 408.
—, *Plasmodiophora* on, may be an amoeba, 796.
—, *Pleospora alternariae* on, in Rumania, 77.
—, 'pock' disease of, 'korab' disease of, in Sumatra identical with, 333.
—, pole rot of curing, in U.S.A., 135.
—, 'polvillo' of, in the Argentine, 269.
—, *Pythium* on, in Sumatra, 333.
—, — *aphanidermatum* on, in S. Africa, 331.
—, — *de Baryanum* on, in India, 158 ; in Porto Rico, 677.
—, — *plerosporon* and *P. polymorphon* on, in U.S.A., 546.
— ring spot, effect of, on yield, 284 ; host range of, 132, 284 ; local lesions in, 334 ; losses caused by, 133 ; notes on, 406, 806 ; occurrence in France, 94 ; in Java, 750 ; in Nyasaland, 806 ; in Rumania, 607 ; in the Ukraine, 90 ; in U.S.A., 132, 133, 284, 334, 407 ; properties of virus of, 132 ; studies on, 132, 133 ; transmission of, by an insect vector, 133 ; by rubbing, 334 ; by seed, 133, (?) 284, 407 ; to beans, 6 ; to potato and tomato, 132 ;

types of, 407, 607; virus of, affecting *Actinomeris alternifolia* in U.S.A., (?) 132, 133; (?) beet in the Ukraine, 90; *Datura stramonium*, (?) *Melilotus officinalis*, melon, (?) *Petunia violacea*, and (?) squash in U.S.A., 132; *Melilotus alba* in U.S.A., 133.
[Tobacco], Rotterdam B disease of, in Sumatra, 333.
—, sand drown of, in U.S.A., 471.
—, *Sclerotinia nicotianae* on, in Hungary, 222.
—, — *sclerotiorum* on, in Russia, 652.
— spot necrosis, local lesions in, 334; occurrence in Rumania, 607; in U.S.A., 334; relation of, to 'healthy potato virus', 595; to tobacco veinbanding, 595; transmission of, by rubbing, 334.
— streak necrosis, complex nature of, 807.
—, sulphur deficiency of, in Nyasaland, 805.
—, *Thielavia basicola* on, see *Thielaviopsis basicola*.
—, *Thielaviopsis basicola* on, breeding against, 7; control, 76, 496, 677; occurrence in Canada, 133; in Porto Rico, 677; in Queensland, 76; in U.S.A., 7, 496; varietal resistance to, 7, 133, 677.
—, tomato aucuba mosaic infecting, intracellular bodies in, 335; production of local lesions by, 408.
—, tomato spotted wilt virus can infect, 549; occurrence in S. Africa, 609.
—, top rot of, in Sumatra, 480.
— veinbanding in Rumania, 607; in U.S.A., 7, 595; relation of, to tobacco and tomato spot necroses, 595; to potato mosaic, 595, 596; virus of, affecting potato, 595; weeds, 7.
— virus diseases, beans as a differential host for, 6.
—, — of *Plantago major* infecting, in U.S.A., 7.
Tolyposporium ehrenbergii on sorghum in Tanganyika, 235.
Tomato (*Lycopersicum esculentum*), *Alternaria solani* on, control, 753; note on, 355; occurrence in New S. Wales, 753; in S. Australia, 680; in U.S.A., 355; study on, 680.
—, — *tomato* on, 680; in U.S.A., 771.
—, *Aplanobacter michiganense* on, control, 483; occurrence in Germany, 483; (?) in Holland, 767; (?) in Mexico, 544; in U.S.A., 210, 224; study on, 210.
—, aucuba mosaic of, effect of, on metabolism, 679; intracellular bodies in, 335; movement of virus in, 207; nature of virus of, 678; occurrence in England, 207, 408, 678, 679, 754; (?) in Trinidad, 610; production of local lesions by, on *Nicotiana* spp., 408; properties of virus of, 679, 735; studies on, 207, 754; transmission of, to *Datura stramonium*, 754; to *Hyoscyamus niger*, 335; to *Nicotiana acuminata* and *N. glutinosa*, 754; to *Solanum nigrum*, *S. nodiflorum*, and tobacco, 335.
[Tomato], *Bacillus aroideae* on, in Japan, 700; (?) in Trinidad, 610; serological study on, 700; transmission of, by *Leptoglossus balteatus* and *Pthia picta*, 610.
—, — *coli-capsici* can infect, 673.
—, bacteria as cause of centre rot of, in U.S.A., 27.
—, bacterial rot of, in Algeria and France, 809.
—, *Bacterium lycopersici* on, in Esthonia, 25.
—, — — *vitiati* on, in Poland, 482.
—, — *solanacearum* on, control, 610, 803; factors affecting, 808; notes on, 123, 610, 808; occurrence in Algeria, 808; in Porto Rico, 29; in S. Africa, 123; in Trinidad, 609; varietal susceptibility to, 29.
—, — (?) *tabacum* can infect, 77.
—, — *vesicatorium* on, in U.S.A., 355.
—, blossom end rot of, in British Guiana, 26; in St. Vincent, 698.
—, *Botrytis cinerea* on, in Esthonia, 25.
— breakdown in Canada, 270.
—, bubbly fruit rot of, in St. Vincent, 699.
—, bunchy top of, in S. Africa, 209, 481; transmission of, to *Physalis peruviana*, 210, 482.
—, 'centre' or 'core' rot of, in U.S.A., 27.
—, *Cercospora canescens* on, 130.
—, *Cladosporium* on, in Esthonia, 25.
—, — *fulvum* on, control, 211, 428, 561, 679, 680, 767; factors affecting, 561; genetics of resistance to, 409; occurrence in England, 211, 679; in Esthonia, 25; in Germany, 680; in Holland, 767; in Jamaica, 625; in Trinidad, 610; in U.S.A., 409, 428, 497, 561; varietal susceptibility to, 409, 497.
—, *Colletotrichum atramentarium* on, in Holland, 767.
—, — *capsici* on, in Malaya, 354.
—, *Corticium solani* on, in U.S.A., 408.
— curly top, breeding against, 335; factors affecting, 210; losses caused by, 335; occurrence in the Argentine, 562; in U.S.A., 210, 335; transmission of, from beet, 562; by *Dicyphus* and *Epitrix*, 562; by *Eutettix tenella*, 210, 419; by *Myzus persicae*, 562; by grafting, 210; not by *Agallia sticticollis*, 562; study on, 335; varietal resistance to, 335.
—, *Didymella lycopersici* on, control, 483, 810; factors affecting, 809; occurrence in the Channel Islands, 494; in Germany, 483, 809; study on, 809; viability of, 810.
— diseases in Trinidad, 610; in U.S.A., 617; legislation against, in S. Africa, 208.
—, *Fusarium* on, in Esthonia, 25; in Trinidad, 610.
—, — *lycopersici* on, breeding against, 356; control, 610, 753; notes on,

355, 610; occurrence in British Guiana, 26; in New S. Wales, 753; in Trinidad, 609; in U.S.A., 27, 355, 356; varietal resistance to, 356.
[Tomato], *Gloeosporium* on, in Trinidad, 610.
—, (?) *Glomerella cingulata* can infect, 313.
— leaf curl in India, 781; in the Sudan, 239.
—, (?) *Macrophomina phaseoli* on, in U.S.A., 27.
— mosaic, attempted artificial cultivation of virus of, 257; control, 753; effect of, on yield, 10; inactivation of virus of, by pulverization, 677; leaf deforming principle of, 755; losses caused by, 226; nature of virus principle in, 678; occurrence in New S. Wales, 753; in Peru, 226; in Trinidad, 610; in U.S.A., 10, 257, 271, 531, 677, 755; relation of, to tobacco mosaic, 271, 808; studies on, 10, 677, 678, 755; transmission of, by *Empoasca fabae, Myzus persicae, Tetranychus telarius,* and *Thrips tabaci,* 531; types of, 610.
—, *Mucor abundans, M. circinelloides,* and *M. hiemalis* can infect, 554.
—, *Oidiopsis* on, in Cyprus, 696.
—, *Phoma destructiva* on, in Trinidad, 610.
—, — *lycopersici* on, in Esthonia, 25.
—, *Phomopsis* on, in Trinidad, 610.
—, *Phytophthora* on, in Trinidad, 610.
—, — *infestans* on, control, 78, 125, 625, 753; factors affecting, 78, 125; losses caused by, 124; occurrence in the Channel Islands, 494; in Esthonia, 25; in Guatemala, 431; in Jamaica, 625; in New S. Wales, 753; in U.S.A., (?) 78, 124.
—, *Pythium* on, in England, 93.
—, — *adhaerens* can infect, 605.
—, — *ultimum* on, in U.S.A., 408.
—, *Rhizopus arrhizus* and *R. fusiformis* can infect, 554.
—, — *nigricans* var. *minor* on, in U.S.A., 554.
—, *Sclerotium rolfsii* on, control, 547; occurrence in Jamaica, 547; in the Philippines, 285; in Trinidad, 610; in U.S.A., 349.
—, *Septoria lycopersici* on, control, 589, 753; occurrence in Esthonia, 25; in Guatemala, 431; in New S. Wales, 753; in S. Africa, 210; in Trinidad, 610; in U.S.A., 589.
— spot necrosis, relation of, to healthy potato virus and tobacco veinbanding, 595.
—, spotted wilt of, control, 753; hosts of, 549, 609; occurrence in Australia, 549; in New S. Wales, 753; in S. Africa, 609; studies on, 549, 609; transmission of, by *Frankliniella insularis,* 78, 549, 609; by *Thrips tabaci,* 78, 550.
—, *Stemphylium solani* on, in U.S.A., 771.
— streak in U.S.A., 271; relation of, to cucumber mosaic, 6; to healthy potato virus, 271, 596; to potato mosaic, 679; to potato streak, 271; to tobacco mosaic, 271, 596; to tomato mosaic, 679. (See also stripe.)
[Tomato] stripe, differences between 'streak' disease and, 679; occurrence in England, 679; in Germany and Holland, 10. (See also streak.)
—, tobacco leaf curl (kroepoek) can infect, 479; occurrence (?) in Nyasaland, 806.
—, tobacco mosaic can infect, 8, 207.
—, *Vermicularia capsici* on, see *Colletotrichum capsici* on.
—, *Verticillium albo-atrum* on, control, 753; note on, 355; occurrence in Bulgaria, 745; in Esthonia, 25; in New S. Wales, 753; in U.S.A., 355.
—, virus disease of, in Holland, 767.
—, — — —, synthesis of a, from tobacco mosaic and potato acronecrosis, 808.
— yellows, see curly top of.
Top die-back of coffee in Java, 636.
— — of *Hevea* rubber in Java, 202.
— necroses X, A, B, and C of potato, see Acronecroses of potato.
— rot of sugar-cane in Indo-China, 432; in Mauritius, 127.
— — of tobacco in Sumatra, 480.
Tortrix, Beauveria laxa on, 179.
Torula epizoa on man and on the dog in Russia, 241.
— *ligniperda* on birch in Canada, 137.
— *sacchari* on cacao in the Dominican Republic, 30.
— — on date palm in U.S.A., 572.
Torulopsidaceae, classification of, 476, 642.
—, relation of, to diseases of man, 642.
Torulopsis, note on, 642.
Toxoptera aurantii as (?) vector of orange mottling in Sicily, 173.
Trachysphaera fructigena on cacao in the Gold Coast, 701.
Tragopogon porrifolius, see Salsify.
Tragus racemosus, streak disease of, in S. Africa, 67.
Trametes carnea on *Chamaecyparis thyoides* in U.S.A., 140.
— *obtusa, Polyporus obtusus* renamed, 337.
— *pini* on *Abies sachalinensis* and larch in Japan, 614.
— — on pine in N. America, 614; in U.S.A., 214.
— — on *Pseudotsuga taxifolia* in N. America, 614; in U.S.A., 615.
— — on spruce in Japan, 614, 616; in N. America, 614.
— —, tests of timber preservatives against, 84.
— *protracta* (?) identical with *Lenzites trabea,* 684.
— *radiata* on birch in Eastern Asia and Siberia, 268.
— *serialis* on timber, action of, 342.
— —, toxicity of coal-tar creosote fractions to, 758.
— *suaveolens* on poplar, *Salix,* and *S. pentandra* in U.S.A., 811.

[*Trametes*] *versatilis* on timber in the Philippines, 218.
Trematosphaeria hydrella on timber in Russia, 612.
Treubiomyces japonicus on oak in Japan, 330.
Trichoderma, decomposition of hemicelluloses by, 263 ; of straw by, 3.
— in soil near maize roots in U.S.A., 803.
— on mushrooms, 493.
— *koningi* renamed *Acrostalagmus koningi*, 325.
— *lignorum*, as monotypic species of *Trichoderma*, 325.
— —, effect of acetaldehyde on growth of, 63.
— — in soil in U.S.A., 264.
— —, toxicity of enzymes of, to wood destroying fungi, 414.
— *narcissi* on crocus and narcissus in Japan, 304.
— —, *Sporotrichum narcissi* renamed, 303.
— *nunbergii* in the feeding galleries of *Pictyogenes curvidens* in conifers in Silesia, 757.
— *viridis*, toxicity of enzymes of, to wood-destroying fungi, 414.
Tricholoma personatum on pine and spruce forming mycorrhiza in U.S.A., 527.
Trichophyton as the cause of leather defects in Germany, 457.
— on man in the Argentine, 43; in Italy, 783 ; conidia of, in pus, 782.
— regarded as belonging to the Gymnoascaceae, 575.
— *acuminatum*, cultural studies on, 373.
— *album*, cultural studies on, 373, 374.
— (?) — on bovines in France, 374.
— —, polymorphism in, 783.
— *areolatum* on man in the Argentine, 783.
— *coccineum* var. *keio* on man in Japan, 646.
— *concentricum* on man in Porto Rico, 646.
— *crateriforme*, cultural studies on, 373.
— *glabrum* on man in Japan, 44.
— *granulosum*, hyphal fusions in, 458.
— *gypseum* on man, factors affecting, 575 ; hyphal fusions in, 458 ; occurrence in Porto Rico, 646.
— —, variation in, 646.
— — var. *farinulentum* on man in Italy, 782.
— *lacticolor* on the guinea-pig in the Argentine, 784.
— *langeroni* on man in Jugo-Slavia, 181, 576.
— *mentagrophytes*, *Ctenomyces* not accepted as ascigerous stage of, 515.
— —, cutaneous electivity in, 107.
— — on the horse in England, 45.
— — on man in England, 45 ; in Japan, 44.
— — on mice in England, 45.
— *pedis* synonym of *T. rubrum*, 44.
— *plicatile* on man in Porto Rico, 646.
— *pruinosum*, cultural studies on, 373.
— *purpureum* on man in Japan, 44.
[*Trichophyton purpureum*] synonym of *T. rubrum*, 44.
— *radiolatum*, cultural studies on, 373.
— *rosaceum* on man, factors affecting, 575.
— —, polymorphism in, 783.
— *rubrum*, *Epidermophyton interdigitale*, *E. salmoneum*, *T. pedis*, *T. purpureum*, and *T. rubidum* synonyms of, 44.
— — on man in China, 44, 458.
— *violaceum*, cultural studies on, 373.
— — on man, factors affecting, 575 occurrence in China, 44 ; in Russia, 241.
Trichosporium lignicolum on timber in Russia, 616.
— *tingens* on timber in Russia, 617.
Trichothecium plasmoparae parasitizing *Plasmopara viticola* in France and U.S.A., 693.
— *roseum* on apple in the Caucasus, 53.
— — on cacao in the Dominican Republic, 30.
Trifolium, see Clover.
Trimethylamine, isolation of, from spores of *Tilletia foetens*, 775.
Triolith as a timber preservative, 14, 85.
Trionymus sacchari, (?) transmission of Fiji disease of sugar-cane by, in Queensland, 327.
Trisetum, effect of germisan on seeds of, 722.
Triticum, see Wheat.
Triumph seed disinfection apparatus, 117.
Tropaeolum majus, *Colletotrichum circinans* can infect, 392.
— —, tomato spotted wilt affecting, in Australia, 549.
Tsuga heterophylla, *Echinodontium tinctorium* on, in Canada, 614.
— —, *Ganoderma oregonense* on, in N. America, 615.
— *sieboldi*, *Fomes pinicola* on, in Japan, 614.
Tubercularia fici on *Ficus magnolioides* in U.S.A., 313.
Tuburcinia antipolitana can infect *Anemons coronaria*, 95.
Tulasnes' Selecta fungorum carpologia, English translation of, 197.
Tulip (*Tulipa*), *Botrytis tulipae* on, in Canada, 108 ; in Denmark, 460.
—, 'breaking' of, control, 718 ; cytology of, 183 ; occurrence in England, 591, 718 ; (?) in France, 183 ; studies on, 183, 718 ; two forms of, 797.
—, diseases of, in U.S.A., 649.
—, 'falling' disease of, in Denmark, 460.
—, fungus (?) symbiont in seeds of, in Italy, 387.
—, *Mycogone tulipae* on, in Italy, 388.
—, mycorrhiza of, in Italy, resistance of the 'stolophyll' to, 528.
—, *Penicillium* on, in Denmark, 460 ; in Italy, 388.
—, — *corymbiferum* on, in Denmark, 460.
—, *Sclerotium delphinii* on, in Holland, 767.
—, — *perniciosum* on, in Holland, 376.

[Tulip, *Sclerotium*] *tulipae* on, in Italy, 388.
—, — *tuliparum* on, control, 376, 460, 694; occurrence in Denmark, 460; in Holland, 376; in Switzerland, 694.
Turf, *Corticium fusiforme* and (?) *C. solani* on, in England, 246.
—, *Helminthosporium* on, in U.S.A., 161.
—, see also Grasses.
Turnip (*Brassica campestris*), *Bacillus* (?) *aroideae* or *B.* (?) *melonis* on, in India, 344.
—, brown heart of, in Canada, 276.
—, *Corticium solani* on, in Sierra Leone, 97.
—, *Phoma lingam* on, in Canada, 276; in Denmark, 489.
—, *Plasmodiophora brassicae* on, control, 623; factors affecting, 623; occurrence in Canada, 276; in England, 623; in Scotland, 759; specialization in, 16; varietal resistance to, 276, 759.
—, reclamation disease of, in Denmark, 767.
—, virus disease of, in the Philippines, 285.
—, virus from *Raphanus raphanistrum* can infect, 427.
Tutan, factors affecting the action of, 707, 773.
—, stimulatory effect of, 708.
—, use of, against *Calonectria graminicola* on rye, 707; against flax diseases, 784; against *Fusarium* on wheat, *Helminthosporium gramineum* on barley, and *Ustilago avenae* on oats, 568.
Twisted top of sugar-cane in Peru, 225; in the Philippines, 266.
Typhula trifolii on clover in Denmark, 304, 768.

U. 520, use of, against *Helminthosporium gramineum* on barley, 766.
Uleomyces piri synonym of *Elsinoe piri*, 724.
Ulmus, see Elm.
Ultra-violet rays, effect of, on *Clonostachys araucaria*, 737; on *Collybia dryophila*, 593; on *Coniosporium bambusae*, *Deuterophoma tracheiphila*, *Epicoccum purpurascens*, 737; on *Erysiphe graminis*, 166; on *Fusarium batatatis*, 593; on *F. martii*, *Helminthosporium gibberosporum*, 737; on *Macrophomina phaseoli*, 593; on *Microascus stysanus*, 737; on moulds on bread, 710; on *Penicillium crustaceum*, 737; on *Puccinia graminis*, 99, 166; on saltation in *Chaetomium cochlioides*, 593.
Uncinula necator on vine, control, 153, 221, 622, 693; factors affecting, 799; occurrence in France, 693; in Germany, 799; in India, 622; in New Zealand, 221; in Tunis, 153.
— *tulasnei* on *Acer platanoides* in Norway, 136.
Urania, composition of, and stimulatory action of, on wheat, 169.
Uredinales, bibliography of Japanese, 128, 332.
—, host index of N. American, 332.
—, terminology of, 746.
—, see also Rusts.
Uredinopsis athyrii on *Abies mayriana* and *Athyrium filix-foemina* var. *melanolepis* in Japan, 813.
— *hirosakiensis* on *Abies mayriana* and *Dryopteris thelypteris* in Japan, 813.
— *intermedia* on *Abies mayriana*, *Athyrium acrostichoides*, and *A. pterorachis* in Japan, 813.
— *ossaeiformis* on *Abies firma*, *A. mayriana*, *A. sachalinensis*, *Dryopteris dilatata*, and *D. monticola* in Japan, 813.
— *woodsiae* on *Abies mayriana* and *Woodsia polystichoides* var. *nudiuscula* in Japan, 813.
Urena lobata, *Phaeolus manihotis* on, in Madagascar, 492.
Urocystis cepulae on leek, legislation against, in Britain, 543.
— — on onion in Bulgaria, 745; legislation against, in Britain, 543.
— *occulta* on rye, control, 38, 162, 706 occurrence in Denmark, 162; in Germany, 38; in Poland, 706.
— *tritici* on wheat, legislation against, in Canada, 544; note on, 695; occurrence in Bulgaria, 745; in China, 290; in Cyprus, 695; varietal resistance to, 290.
Uromyces ambiguus on *Allium* in Switzerland, 619.
— *appendiculatus* on bean in Guatemala, 431; in U.S.A., 284.
— *behenis* on *Silene maritima* in France, 722.
— *betae* on beet in the Ukraine, 91; *Darluca filum* parasitizing, 91.
— *caladii* on *Arisaema triphyllum*, parasitic action of, 391.
— *caryophyllinus* on carnation in U.S.A., 28.
— —, spore germination tests of, 730.
— *decoratus* on *Crotalaria juncea* in Ceylon, 223.
— *fabae* on bean in Guatemala, 431.
— — on lentils in Cyprus, 695.
— *fallens* on wheat, method of penetration by, 440.
— *pisi* on *Euphorbia*, *E. cyparissias*, *Lathyrus*, and peas in Germany, 760.
— *trifolii* on clover in England and Wales, 423.
Urophlyctis, morphology of, 403.
— *bohemica*, *Olpidium trifolii* confused with, 721.
Urtica, see Nettles.
Uspulun, absorption of mercury from, by treated wheat seed, 168.
—, stimulatory action of, on wheat, 168, 169.
—, use of, against *Armillaria mellea*, 681; against *Cercospora beticola* on beet, 348; against *Cladosporium cucumerinum* on cucumber, 691; against *Didymella lycopersici* on tomato, 810; against *Fusarium* on narcissus, 376; on wheat, 568; against *Phoma lingam* on crucifers, 489; against *Plasmodiophora brassicae* on mustard, 490; against *Sclerotium tuliparum* on tulip, 694.
— dust, use of, against *Helminthosporium*

gramineum on barley and *Ustilago avenae* on oats, 568.
[Uspulun] -universal, *dosis tolerata* of, for tomato seed, 483.
— —, persistence of, on treated seed grain, 361, 706.
— —, stimulatory action of, on wheat, 169.
— —, use of, against *Colletotrichum* on tobacco, 753; against *Fusarium* on wheat and *Helminthosporium gramineum* on barley, 568.
(?) *Ustilaginoidea virens* on rice in Sierra Leone, 97.
Ustilago avenae on oats, antibiosis of bacteria to, 98; control, 35, 163, 290, 568, 633; effect of, on susceptibility to *Puccinia graminis*, 362; genetics of resistance to, 233, 362, 445, 498; hybridization of, with *U. kolleri*, 37; occurrence in Canada, 362; in Denmark, 163; in Germany, 65, 564; in Russia, 35, 290; in Sweden, 568; in U.S.A., 37, 233, 445, 498, 506, 633; physiologic forms of, 506; seed certification against, in Germany, 65; segregation in, 37; studies on, 37, 233, 362, 445, 506.
— *bromivora* on *Bromus arvensis* in Denmark, 304.
— *eleusinis* on *Eleusine coracana* in India, 158.
— *hordei* on barley, control, 505, 560, 776; losses caused by, 560; occurrence in Canada, 293; in Germany, 65; in New Zealand, 505, 776; in Queensland, 505; in U.S.A., 560; seed certification against, in Germany, 65; varietal resistance to, 560.
— *kolleri* on oats, antibiosis of bacteria to, 98; control, 633; effect of, on susceptibility to *Puccinia graminis*, 362; genetics of resistance to, 233, 362, 445, 498; hybridization of, with *U. avenae*, 37; occurrence in Canada, 362; in U.S.A., 37, 233, 362, 445, 498, 506, 633; physiologic forms of, 506; segregation in, 37, 118; studies on, 118, 362, 445; varietal resistance to, 506.
— *nuda* on barley, control, 505, 567, 633; factors affecting, 165, 567; genetics of resistance to, 666, 710, 776; losses caused by, 633, 776; occurrence in Canada, 293; in Germany, 65, 633, 666, 710, 776; in New Zealand, 505; in U.S.A., 165, 567; physiologic forms of, 710; seed certification against, in Germany, 65; studies on, 165, 567, 710, 776; types of infection by, 567; varietal resistance to, 666, 710, 776.
— *panici-miliacei* on *Panicum miliaceum* in Lithuania, 566.
— *perennans* on *Avena elatior* in Denmark, 304.
— *scitaminea* on sugar-cane in Indo-China, 432; in Mauritius, 127; in the Philippines, 203; varietal susceptibility to, 432.
[*Ustilago*] *tritici* on wheat, breeding against, 666, 775; control, 289, 443; effect of, on susceptibility to *Puccinia graminis*, 563; factors affecting, 165; nature of resistance to, 281; notes on, 443; occurrence in Canada, 289, 443; in Germany, 65, 666, 774; in Russia, 281; in Tunis, 443; in U.S.A., 165, 563; physiologic forms of, 443, 666, 774; seed certification against, in Germany, 65; studies on, 165, 666, 774; varietal resistance to, 281, 563, 666.
— *zeae* on maize, antibiosis of bacteria to, 98, 103; cytology of, 569; effect of rare elements on susceptibility to, 507; of, on yield, 431; genetics of, 363, 446; heterothallism in, 363, 569; nature of resistance to, 507; nodal infection by, 447; occurrence in Cyprus, 103; in France, 507; in Germany, 569; in Guatemala, 431; in U.S.A., 103, 363, 446, 447, 498; studies on, 363, 446, 447, 569.
Ustulina zonata on *Hevea* rubber, control, 2; occurrence in the Belgian Congo, 2; in Ceylon, 400; in Malaya, 325, 672.

Vaccinium macrocarpon and *V. oxycoccus*, see Cranberry.
Valsa japonica can infect apricot, cherry, nectarine, and *Prunus mume*, 60.
— — on peach in Japan, 60.
Vanilla (*Vanilla planifolia*), *Botryosphaeria vanillae*, *Cephaleuros henningsii*, and *Nectria vanillae* on, in Madagascar, 699.
Vaseline, action of, in preventing fungal invasion of cut stalks, 63.
Vegetable marrow (*Cucurbita pepo*), *Brachycladium spiciferum* on, in Cyprus, 696.
— — mosaic in England, 144.
— —, *Rhizopus arrhizus* on, in U.S.A., 554.
— —, *Septoria cucurbitacearum* on, in Bulgaria, 745; in Kenya, 159.
Vegetable oils, fungicidal properties of, 253.
Vegetables, diseases of, control in Germany, 687; spray warnings against, in U.S.A., 729.
—, *Fusarium* on, in U.S.A., 554.
Veinbanding of tobacco in Rumania, 607; in U.S.A., 7, 595; relation of, to potato rugose mosaic, 595, 596; to tobacco and tomato spot necrosis, 595; virus of, affecting potato, 595; weeds, 7.
'Vek' dusting apparatus, 64.
Venturia chlorospora on *Salix*, pathogenicity of, 214. (See also *Fusicladium saliciperdum*.)
— *fraxini* on ash in Norway, 136.
— *inaequalis* on apple, ascospore discharge of, 112, 308; control, 49, 50, 80, 112, 113, 114, 161, 185, 252, 307, 427, 520, 581, 582, 626, 694, 725, 726, 787, 788; factors affecting, 48, 799; legislation against, in England, 80;

nature of resistance to, 48, 307 ; note on, 654 ; occurrence in Austria, 799 ; in Canada, 252, 308 ; in Denmark, 185 ; in England, 48, 49, 50, 80, 112, 113, 307, 725 ; in Germany, 559 ; in New S. Wales, 114, 185 ; in Norway, 49, 582 ; in Switzerland, 694 ; in Tasmania, 112, 307 ; in U.S.A., 161, 427, 461, 520, 581, 626, 654, 726, 787, 788 ; overwintering of, 49 ; phenology of, 50 ; shoot infection by, 725 ; spray warnings against, in U.S.A., 161, 726 ; strains of, 461 ; studies on, 48, 49, 50, 307 ; varietal resistance to, 49 ; viability of, 48.

[*Venturia inaequalis*], production of sulphuretted hydrogen by, from sulphur, 465.

— *pirina* on pear, ascospore discharge in, 112 ; control, 80, 112, 113, 115, 307, 494, 582, 660, 694 ; infection of spur wood and bud scales by, 659 ; of stems by, 115 ; legislation against, in England, 80 ; occurrence in Austria, 799 ; in the Channel Islands, 494 ; in England, 80, 113, 659 ; in Germany, 559 ; in Norway, 582 ; in Switzerland, 694 ; in Tasmania, 112, 115, 307 ; phenology of, 799 ; study on, 659 ; varietal susceptibility to, 659.

(?) — *rhododendri* on *Rhododendron* in Japan, 518.

— *tremulae* on aspen in Norway, 136 ; *Fusicladium radiosum* conidial stage of, 136.

Vermicularia capsici, *V. curcumae*, *V. jatrophae*, *V. punctiforme*, and *V. zingiberis*, transferred to *Colletotrichum*, 545.

Vernonia, leaf curl of tobacco affecting, in Nyasaland, 806 ; in Tanganyika, 676.

Verticilliopsis infestans on mushrooms (?) in Austria and Denmark, 493.

Verticillium on *Acer* in U.S.A., 411.

— on apple in U.S.A., 378.

— on apricot in Switzerland, 187.

— on chrysanthemum in U.S.A., 375.

(?) — on man in the Argentine, 516.

— on mushrooms in U.S.A., 764.

— *albo-atrum*, differences between *V. dahliae* and, 130.

— — on *Acer negundo* in Bulgaria, 745.

— — on *Acer platanoides*, *A. saccharum*, and *Ailanthus glandulosa* in U.S.A., 755.

— — on apple and chilli in Bulgaria, 745.

— — on chrysanthemum in Germany, 785.

— — on cotton, control, 514 ; effect of, on yield, 514 ; occurrence in Bulgaria, 745 ; in Russia, 41 ; (?) in U.S.A., 513, 699 ; study on, 513 ; varietal resistance to, 514.

— — on eggplant in Bulgaria, 745 ; in U.S.A., 626.

— — on elm in U.S.A., 755.

— — on peach and plum in Bulgaria, 745.

— — on potato in Norway, 670.

— — on trawberry in U.S.A., 187, 727.

[*Verticillium albo-atrum*] on tomato, control, 753 ; note on, 355 ; occurrence in Bulgaria, 745 ; in Esthonia, 25 ; in New S. Wales, 753 ; in U.S.A., 355.

— *cinnamomeum* on *Aleyrodes citri* and scale insects in U.S.A., 641 ; previously referred to *V. heterocladum*, 641.

— *dahliae* can infect *Acer pseudoplatanus*, apricot, and potato, 550.

— —, differences between *V. albo-atrum* and, 130.

— — on *Ailanthus glandulosa* in France, 95, 550.

— — on apricot in France, 23, 792.

— — on raspberry in England, 61.

— *heterocladum*, *V. cinnamomeum* previously referred to, 641.

— *monosporioides* on eggs in Italy, 641.

— (?) *ovatum* on rose in Canada, 245.

— *vilmorinii* on Michaelmas daisy in England, 623.

Vetch (*Vicia* spp.), *Ascochyta pinodella* on, in U.S.A., 345.

—, *Botrytis fabae* can infect, 346.

—, *Mycosphaerella pinodes* on, in U.S.A., 345.

—, *Olpidium trifolii* can infect, 720.

—, — *viciae* on, in Japan, 720.

Viburnum, *Macrophoma gloeosporioides* on, in France, 651.

— *davidi*, (?) *Ascochyta tini*, *Coniothyrium viburni*, and *Macrophoma gloeosporioides* on, in France, 651.

— *dentatum*, *Phytomonas viburni* on, in U.S.A., 110.

— *opulus*, *Coniothyrium viburni* on, in Hungary, 651.

— —, *Phytomonas viburni* on, in U.S.A., 110.

— *tomentosum*, *Phytomonas viburni* on, in U.S.A., 110.

Vicia spp., see Vetch.

— *faba*, see Bean.

Vigna catjang, see Cowpea.

— *glabra*, *Cercospora canescens* on, 130.

— *oligosperma*, diseases of, in Ceylon, 601.

— *sesquipedalis*, mosaic of, 417.

— *sinensis*, see Cowpea.

Vinca, rosette of groundnut affecting, in the Gambia, 697.

Vine (*Vitis*), *Bacillus baccarinii* on, in Italy, 281.

—, *Bacterium tumefaciens* on, control, 655 ; occurrence in Germany, 655 ; in Russian Central Asia, 316.

—, *Botrytis cinerea* on, control, 623 ; occurrence in France, 623 ; in Germany, 495 ; in Switzerland, 692 ; study on, 623 ; varietal susceptibility to, 495.

—, *Coniothyrium diplodiella* on, control, 692 ; effect of, on quality of wine, 21 ; notes on, 692 ; occurrence in Switzerland, 21, 24, 692 ; in Uruguay, 226 ; viability of, 24.

—, *Cryptosporella viticola* on, in Canada, 790.

— diseases in Tunis, 153 ; losses caused by, in Germany, 66.

[Vine], *Fusarium* on, in Russian Central Asia, 316.
—, *Gloeosporium ampelophagum* on, control, 352; note on, 622; occurrence in Australia, 352; in France, 351; in India, 622; sap concentration in relation to, 351.
—, (?) *Glomerella cingulata* can infect, 313.
—, *Guignardia bidwellii* on, legislation against, in Austria, 416; in Spain, 752; occurrence in Austria, 416; in France, 351; in India, 222; sap concentration in relation to, 351.
—, leaf roll of, in Czecho-Slovakia, 280; in Italy, 21.
— mosaic in Czecho-Slovakia, 157, 280.
—, *Phakopsora vitis* on, in Ceylon, 223.
—, *Plasmopara viticola* on, control, 24, 153, 154, 221, 351, 422, 663, 664, 692, 693, 764; by chemical dyes, 221, 622, 663; factors affecting, 24, 155, 221, 351, 422, 495, 622, 692, 799; forecasting attacks of, 622, 692, 764; nature of resistance to, 155, 351, 507; notes on, 94, 220, 622; occurrence in France, 94, 153, 154, 155, 220, 221, 351, 422, 507, 622, 663, 664, 693, 764; in Germany, 495, 764, 799; in India, 622; in Italy, 692; in Russia, 93; in Switzerland, 24, 692; in Tunis, 153, 351; in U.S.A., 693; phenology of, 93, 351, 422, 622, 692, 764; sap concentration in relation to, 155, 351; *Trichothecium plasmoparae* parasitizing, 693; varietal resistance to, 154, 764.
—, 'roncet' of, see leaf roll of.
—, *Rosellinia necatrix* on, in Italy, 765; in Switzerland, 24.
—, storage rots of fruit of, control by ammonia, 366.
—, *Uncinula necator* on, control, 153, 221, 622, 693; factors affecting, 799; occurrence in France, 693; in Germany, 799; in India, 622; in New Zealand, 221; in Tunis, 153.
— wilt in Italy, 765.
Vinegar, use of, against damping-off of plants in U.S.A., 496. (See also Acetic acid.)
Violet (*Viola*), *Macrophomina phaseoli* on, in India, 426.
Virus disease of artichoke in U.S.A., 162.
— — of *Calendula officinalis* in S. Africa, 427.
— — of Chinese cabbage and Chinese radish in the Philippines, 285.
— — of crocus in England, 591.
— — of *Dolichos biflorus* and *D. lablab* in India, 150.
(?) — — of elm in U.S.A., 410.
— — of freesia and gladiolus in England, 591.
— — of *Hyoscyamus* in England, 735.
— — of iris and lily in England, 591.
— — of maize resembling streak in Tanganyika, 592.
— — of mustard in the Philippines, 285.
— — of narcissus in England, 591.
[Virus disease] of *Pachyrrhizus angulatus* in the Philippines, 285.
— — of *Passiflora* in S. Africa, 427.
— — of *Pelargonium hederaceum* and *P. zonale* in Belgium, 649; transmission of, to tobacco, 650.
— — of *Plantago major* in U.S.A., 7; infecting tobacco in U.S.A., 7.
— — of *Prunus japonica* in U.S.A., 7; can infect peach, 7.
— — of *Raphanus raphanistrum* in S. Africa, 427; can infect turnip, 427.
— — of *Sternbergia* in England, 591.
— — of *Tithonia diversifolia* in S. Africa, 427.
— — of tomato in Holland, 767; synthesis of, from potato acronecrosis and tobacco mosaic, 808.
— — of turnip in the Philippines, 285.
— — of watermelon in the Philippines, 285.
— — A of potato in Ireland, 740; relation of, to potato crinkle, 740.
— diseases, characterization of, by the insect vector, 591.
— —, nature of, 66, 394, 734.
— —, present status of knowledge of, 66, 734, 796.
— — of beet in the Caucasus, Russia, and the Ukraine, 89.
— — of plants, list of, in Japan, 797.
— — of potato, complex nature of, 394, 738; control, 68, 122, 395; effect of, on yield, 597; factors affecting, 120, 121, 531; maintenance of stocks free from, 596; notes on, 68; occurrence in Belgium, 121, 800; in England, 596; in Germany, 65, 121, 531; in Holland, 96, 800; in New S. Wales, 395; in Portugal, 68; in Scotland, 68; in Switzerland, 120; in Tasmania, 122; in Victoria, 395; pathological modifications in, 68, 121; transmission of, by true seed, 199; varietal susceptibility to, 68, 120. (See also Degeneration of.)
— — of raspberry in U.S.A., 428.
— — of Solanaceae in Ceylon, 223.
— — of tobacco, beans as a differential host for, 6.
— *x*, *y*, and *z* in potato virus diseases, 394, 594, 738, 741.
Vitis, see Vine.
Vitrioline, use of, against wheat bunt, 289.
Volck, composition of, and use of, against *Sphaerotheca humuli* on hops, 253.
Volutella epicoccum on scale insects on *Cinnamomum ovalifolium*, 179.
Vomasol C, use of, against *Pestalozzia* (?) *guepini* on *Rhododendron indicum*, 650.

Walnut (*Juglans*), *Armillaria mellea* on, in France, 95.
—, *Bacterium juglandis* on; notes on, 79, 338; occurrence in England, 79, 338; (?) in France, 339; in Italy, 338, 766; in various countries, 338.
—, *Botrytis cinerea* on, in England, 80.

[Walnut], *Chalaropsis thielavioides* on, in England, 80, 432 ; in Wales, 423.
—, *Cytospora juglandina* on, in England, 79.
—, *Diaporthe perniciosa* on, in England (*Phomopsis* stage), 79.
— diseases, control, in France, 247.
—, *Fusarium lateritium* and *F. sambucinum* on, in Germany, 339.
—, *Gnomonia leptostyla* on, in England, 79 ; *Marssonina juglandis* conidial stage of, 79.
—, *Mucor* on, in England, 80.
—, *Nectria* on, in Canada, 411 ; in U.S.A., 411, 551.
—, *Penicillium* and *Pestalozzia hartigii* on, in England, 80.
—, *Phytophthora* (?) *cactorum* on, in U.S.A., 339.
—, *Polyporus hispidus* on, in Bulgaria, 475.
—, *Rhizopus nigricans* and *Stysanus stemonites* on, in England, 80.
Watercore of apple in U.S.A., 55.
Watermelon (*Citrullus vulgaris*), *Alternaria cucumerina* on, in Cyprus, 696 ; *A. brassicae* var. *nigrescens* considered identical with, 696.
—, *Brachycladium spiciferum* on, in Cyprus, 696.
—, *Colletotrichum lagenarium* on, in Hungary, 620 ; in U.S.A., 422.
—, cucumber virus 2 can infect, 349.
—, *Fusarium niveum* on, breeding against, 558 ; factors affecting, 557 ; occurrence in U.S.A., 422, 557, 558 ; strains of, 422, 557 ; studies on, 557, 558 ; varietal resistance to, 422, 558.
—, *Sclerotium rolfsii* on, in U.S.A., 349.
—, virus disease of, in the Philippines, 285.
Water pollution, abstracts of current literature on, 467.
Waterproofing canvas against mildew in U.S.A., 240.
Wa-wa dust, use of, against *Ustilago avenae* and *U. kolleri* on oats, 634.
Waxed paper wraps, use of, against diseases of orange in storage, 570.
Wettability of sprays, determination of, 153.
Wheat (*Triticum*), *Alternaria* on, in Canada, 291, 292.
—, *Bacterium atrofaciens* on, (?) in Italy, 544 ; in S. Africa, 227.
—, — *translucens* var. *undulosum* on, control, 286 ; occurrence in Kenya, 163 ; in Russia, 286 ; in U.S.A., 434 ; studies on, 286, 434.
—, black point (physiological) of, in the Argentine, 100.
—, — — of, see also *Helminthosporium* on.
—, *Calonectria graminicola* on, in Germany, 444 ; varietal susceptibility to, 228.
—, *Cercosporella herpotrichoides* on, in France, 361, 503.
— diseases in U.S.A., losses caused by, 770.
[Wheat], *Erysiphe graminis* on, in Czecho-Slovakia, 157 ; in New Zealand, 32.
—, *Fusarium* on, control, 569 ; mixed inoculations with, 708 ; notes on, 291, 294 ; occurrence in Australia, 709 ; in Canada, 291, 294 ; in England, 623 ; in Kenya, 163 ; in Sweden, 568.
—, — *arcuosporum* and *F. arthrosporioides* on, in Russia, 709.
—, — *culmorum* on, control, 632 ; factors affecting, 291 ; histological effects of, 293 ; occurrence in Australia, 709 ; in Bulgaria, 745 ; in Canada, 293 ; in England, 632 ; in Germany, 444 ; in Lithuania, 632 ; studies on, 632, 709.
—, — *dimerum* on, in Russia, 709.
—, — *scirpi* vars. *nigrans* and *pallens* on, in Great Britain, 504.
—, — *solani* f. *minus* on, in Russia, 709.
—, *Gibberella saubinetii* on, in the Argentine, 505.
—, *Helminthosporium* on, in Canada, 294 ; in India, 632.
—, — *nodulosum* can infect, 426.
—, — *sativum* on, control, 292, 504, 567, 632 ; factors affecting, 291, 292, 530 ; histological effects of, 293 ; immunization against, 529 ; mixed inoculations with, 708 ; notes on, 291 ; occurrence in Canada, 169, 291, 292, 293 ; in England, 632 ; in India, 426, 633 ; in New S. Wales, 503 ; in Peru, 225 ; in S. Africa, 529 ; in Western Australia, 567 ; studies on, 169, 292, 503, 529, 632 ; varietal susceptibility to, 225, 426, 503, 633.
—, — *tritici-repentis* on, in India, 426.
—, *Leptosphaeria culmifraga* on, in Belgium, 772.
—, — *herpotrichoides* on, in France, 361, 503 ; in Canada, 291.
—, magnesium deficiency disease of, in Germany, 101.
—, *Mucor* on, in Canada, 294.
—, *Ophiobolus graminis* on, control, 567 ; effect of, on yield, 291 ; factors affecting, 291, 361, 503, 708, 775 ; histological effects of, 293 ; notes on, 444, 503 ; occurrence (?) in Australia, 709 ; in Belgium, 772 ; in Canada, 291, 293, 708 ; in France, 503 ; in Germany, 361, 444, 775 ; in Western Australia, 567 ; studies on, 291, 361, 708 ; varietal susceptibility to, 291, 772.
—, — *herpotrichus* on, in Czecho-Slovakia, 157 ; in France, 503.
—, *Puccinia* on, in Russia, 628 ; in Tunis, 436.
—, — *anomala* can infect, 37.
—, — *glumarum* on, breeding against, 163 ; control, 500 ; epidemiology of, 564 ; factors affecting, 31, 98, 163, 167, 499, 630, 704 ; genetics of resistance to, 666 ; method of inducing artificial epidemics of, 167, 564 ; notes on, 630 ; occurrence in the Argentine, 499 ; in Belgium, 772 ; in France, 22 ; in Germany, 31, 98, 167, 564, 666, 704 ; in Kenya, 163 ; in Peru, 225 ;

in Rumania, 156; in Uruguay, 226, 630; specialization in, 167; varietal susceptibility to, 22, 163, 167, 499, 666, 772.
[Wheat, *Puccinia*] *graminis* on, artificial infection of, in resistance tests, 168; breeding against, 31, 163, 227, 429; control, 32, 286; effect of light on, 166, 563, 629; of loose smut infection on, 563; of, on yield, 32; epidemiology of, 225, 230, 436, 437; factors affecting, 98, 166, 230, 287, 563, 629, 704; genetics of resistance to, 227, 438, 439; germination of teleutospores of, 164, 230, 288; hybridization of, 229; infection of barberry by, in S. Africa, 164; nature of resistance to, 439, 562; occurrence in the Argentine, 499; in Brazil, 358; in Canada, 166, 227, 229, 230, 286, 287, (?) 437, 438, 439, 629; in Germany, 31, 98, 704; in Kenya, 159, 163; in Mexico, 436, 437; in New Zealand, 32; in Paraguay, 358; in Peru, 225; in Rumania, 156; in S. Africa, 164, 230; in Uruguay, 358, 630, 704; in U.S.A., 436, 437, 562; physiologic forms of, 159, 227, 229, 230, 262, 287, 436, 437, 438, 629; studies on, 98, 287, 438, 439, 562, 629, 704; varietal susceptibility to, 31, 159, 163, 225, 227, 439, 629, 630.
—, — *triticina* on, artificial infection of, in resistance tests, 168; breeding against, 163; control, 32, 286, 440; by dusting, 196; differential varieties for forms of, 288; effect of, on chemical composition of host, 440; on yield, 32, 440; factors affecting, 32, 98, 166, 231, 629, 704; germination of teleutospores of, 166, 629; of uredospores of, 32; method of infection by, 440; note on, 31; occurrence in the Argentine, 358, 499; in Austria, 288; in Brazil, 359; in Bulgaria, 33, 288, 359; in Canada, 229, 286; in France, 22; in Germany, 98, 231, 288, 564, 704; in Holland and Hungary, 288; in Italy, 196; in Kenya, 163; in New S. Wales, 629; in New Zealand, 32; in Paraguay, 358; in Rumania, 156; in Russia, 282; in Uruguay, 358, 630, 704; in U.S.A., 440; overwintering of, 229; physiologic forms of, 33, 231, 288, 359, 629; studies on, 98, 288, 359, 704; varietal susceptibility to, 22, 231, 282, 359, 440, 630.
—, *Pythium* on, in Canada, 294; in Italy, 164.
—, — *arrhenomanes* var. *canadensis* on, in Canada, 434.
—, — *graminicolum* can infect, 435.
—, — *splendens* var. *hawaiianum* on, in Hawaii, 546.
—, — *volutum* on, in Canada, 434.
—, *Rhizoctonia* on, in Canada, 291.
—, *Rhizopus* on, in Canada, 294.
—, — *nigricans* on, effect of enzymes and toxins produced by, on germination, 389.
[Wheat], *Sclerotium rhizodes* on, in U.S.A., 499.
—, *Septoria briosiana* on, in Italy and Spain, 329.
—, — *graminum* on, in France, 709.
—, — *nodorum* on, control, 445; factors affecting, 444; note on, 766; occurrence in Germany, 444; in Holland, 766; in Kenya, 163; study on, 444.
—, — *tritici* on, in Bulgaria, 745; in Czecho-Slovakia, 157.
—, *Tilletia caries* on, action of mercury salts on spores of, 501; breeding against, 360; control, 35, 100, 162, 232, 289, 290, 442, 443, 502, 503, 566, 706, 707; effect of, on adhesiveness of seed dusts, 442; on plant growth, 22, 502, 565, 631; of sowing date on, 705, 706; of wounding on susceptibility to, 630; experimental production of leaf galls by, 705; factors affecting, 289, 564, 624, 630, 631, 705, 706; genetics of resistance to, 33, 100, 360, 500; heterothallism in, 440; hybridization of, with *T. foetens*, 440, 706; losses caused by, 232; method of culturing and inoculating, 289; notes on, 22, 443; occurrence in Canada, 289, 293, 360; in Czecho-Slovakia, 157, 624; in Denmark, 162; in England, 35, 500; in France, 22, 100, 442, 566; in Germany, 65, 502, 503, 564, 707; in Hungary, 501; in Italy, 630, 631; in Lithuania, 566; in New S. Wales, 99; in Palestine, 35, 361; in Poland, 706; in Rumania, 156; in Russia, 35, 290; in S. Europe, 442; in Tunis, 442, 443; in U.S.A., 33, 162, 232, 440, 500, 502, 565, 705, 706; physiologic forms of, 33, 35, 360, 440, 500, 565, 705; seed certification against, in Germany, 65; strains of, 565; studies on, 360, 442, 500, 564, 565, 630, 705; varietal resistance to, 33, 34, 35, 360, 442, 500, 630, 705.
—, — *foetens* on, breeding against, 360; control, 35, 100, 232, 289, 290, 442, 443, 502, 566, 706, 707; effect of, on adhesiveness of seed dusts, 442; on plant growth, 22, 502, 565, 631; of sowing date on, 705, 706; of wounding on susceptibility to, 630; experimental production of leaf galls by, 705; factors affecting, 289, 565, 630, 705; genetics of resistance to, 33, 360; heterothallism in, 440; hybridization of, with *T. caries*, 441, 706; losses caused by, 156, 232; method of culturing, 169, 289; of inoculating, 289; notes on, 22, 443; occurrence in Canada, 289, 293, 360; in France, 22, 100, 442, 566; in Germany, 65, 502, 565, 707; in Italy, 630, 631; in Rumania, 156; in Russia, 35, 290; in Tunis, 442, 443; in U.S.A., 33, 232, 440, 499, 502, 565, 705, 706; physiologic forms of, 33, 360, 440, 499, 565, 705; seed certification against, in Germany, 65; studies on, 360, 442, 564, 565, 630, 705; tri-

methylamine in spores of, 775 ; varietal resistance to, 33, 360, 442, 565, 630.
[Wheat, *Tilletia*] *indica* on, in India, 425.
—, *Urocystis tritici* on, legislation against, in Canada, 544 ; note on, 695 ; occurrence in Bulgaria, 745 ; in China, 290 ; in Cyprus, 695 ; varietal resistance to, 290.
—, *Uromyces fallens* on, method of penetration by, 440.
—, *Ustilago tritici* on, breeding against, 666, 775 ; control, 289, 443 ; effect of, on susceptibility to *Puccinia graminis*, 563 ; factors affecting, 165 ; nature of resistance to, 281 ; notes on, 443 ; occurrence in Canada, 289, 443 ; in Germany, 65, 666, 774 ; in Russia, 281 ; in Tunis, 443 ; in U.S.A., 165, 563 ; physiologic forms of, 443, 666, 774 ; seed certification against, in Germany, 65 ; studies on, 165, 666, 774 ; varietal susceptibility to, 281, 563, 666.
—, *Wojnowicia graminis* on, in France, 503 ; in Western Australia, 567.
White spot of clover attributed to potash deficiency in Denmark, 768.
— zinc paint, use of, as a wound dressing for tea, 131.
Willow, see *Salix*.
Wilt of coco-nut [non-parasitic] in British Guiana, 26.
— of coffee in British Guiana, 236.
— of pineapple in Hawaii, 191.
— of strawberry in U.S.A., 771.
— of vine in Italy, 765.
Winter injury of apple in U.S.A., 656.
— — of clover in U.S.A., 460.
— — of lucerne in U.S.A., 224.
— — of pecan in U.S.A., 213.
Witches' broom of *Holodiscus discolor* in U.S.A., 110.
— — of potato in U.S.A., 596, 667.
— — of tea in Ceylon, 749.
Withering leaf disease of coco-nut in St. Lucia, 27.
Withertip of grapefruit, lime, and orange in Jamaica, 26.
Wojnowicia graminis on wheat in France, 503 ; in Western Australia, 567.
Wood ash + anhydrous copper sulphate, use of, against wheat bunt, 290.
Wood's rays, effect of, on *Puccinia graminis*, 99.
Woodsia polystichoides var. *nudiuscula*, *Uredinopsis woodsiae* on, in Japan, 813.
Wound gum formation in peach and vine, 790.

X bodies in mosaic of *Iris tingitana*, 796 ; in potato infected by the *x* or *z* viruses, 595 ; in potato crinkle, mosaic, and streak, 532.
X-rays, effect of, on *Collybia dryophila*, *Fusarium batatatis*, and *Macrophomina phaseoli*, 593 ; on *Puccinia graminis*, 99 ; on saltation in *Chaetomium cochlioides*, *Mucor genevensis*, and *Phycomyces blakesleeanus*, 593.
x virus of potato, 394, 594, 738, 741.
Xanthosoma sagittifolium, *Fusarium* on, in the Gold Coast, 763.
— —, *Phyllosticta colocasiae* on, in the Gold Coast, 696, 763.
— —, *Pythium aphanidermatum*, *Rhizoctonia*, and *Sclerotium rolfsii* on, in the Gold Coast, 763.
Xylamon, use of, against *Stereum* (?) *purpureum* on beech logs, 414.
Xylaria hypoxylon, resistance of, to extreme cold, 318.
— *mali* on apple in U.S.A., 284.
Xylol, use of, against (?) *Tarsonemus floricolus* in fungus cultures, 118.

y and *y'* viruses of potato, 394, 594, 738, 741.
Yams (*Dioscorea*), *Botryodiplodia theobromae* on, in the Gold Coast, 696.
—, *Cercospora dioscoreae* on, in Ceylon, 223.
Yeast from beer, resistance of, to extreme temperatures, 318.
Yeasts on cacao in the Dominican Republic, 31.
— on dates in U.S.A., 384.
Yellow crinkle of papaw in Queensland, 157.
— dwarf of onion in U.S.A., 420, 556, 760 ; properties of virus of, 420 ; transmission of, by aphids, 760 ; by *Aphis maidis*, *A. rumicis*, *Cicadula sexnotata*, and *Rhopalosiphum prunifoliae*, 557.
— — of potato in U.S.A., 743.
— flat of lily in Bermuda, 97 ; in Holland, 244.
— oxide of mercury, use of, against *Actinomyces scabies* and *Corticium solani* on potato, 671.
— spot of pineapple in Hawaii, 78, 116, 191, 218, 586 ; relation of, to *Crotalaria* mosaic, 116 ; to pea streak, 218 ; studies on, 116, 191, 586 ; transmission of, by *Thrips tabaci*, 78, 116, 191, 218, 586 ; from *Crotalaria*, 116 ; to *Bidens pilosa*, *Emilia flammea*, *Senecio hieracifolia*, and *Sonchus oleraceus*, 586.
Yellowing disease of beet in Holland, 96, 767.
Yellows of aster (China) in U.S.A., 302 ; (?) affecting *Erigeron canadensis* in U.S.A., 521.
— of peach, control, 790 ; notes on, 406, 626 ; occurrence in U.S.A., 354, 406, 521, 626, 789 ; study on, 521 ; transmission of, (?) by insects, 521 ; (?) from weeds, 521 ; not by pollen, 354 ; types of, 521 ; (?) virus of, affecting *Tecoma radicans* in U.S.A., 521.
— of spinach in Czecho-Slovakia, 258.
— of strawberry, 250 ; in U.S.A., 497.
— of tea (sulphur deficiency disease) in Nyasaland, 427, 805.
— of tobacco (sulphur deficiency disease) in Nyasaland, 805.

Yucca, *Coniothyrium concentricum* on, in England, 22
z virus of potato, 394, 594, 738, 741.
Zantedeschia aethiopica, *Phoma zantedeschiae* on, in S. Africa, 267.
— —, *Phyllosticta richardiae* on, in the British Isles, 517.
Zea mays, see Maize.
Zelkova serrata, *Ceratostomella ulmi* can infect, 484.
Ziarnik, use of, against *Urocystis occulta* on rye, and wheat bunt, 706.
Zinc chloride, use of, against *Bacillus amylovorus* on apple, 111; as a timber preservative, 83, 85, 146, 617, 685, 815; as a wound dressing, 186.
— meta-arsenite, use of, as a timber preservative, 85, 686.
— sulphate, use of, against *Bacterium pruni* on peach, 584, 660; against *Cladosporium carpophilum* and *Sclerotinia americana* on peach, 661; to prevent lead arsenate spray injury, 520; hot water seed steeping injury, 280.
Zingiber officinale, see Ginger.
Zinnia, *Erysiphe cichoracearum* on, *Cicinnobolus cesatii* parasitizing, in U.S.A., 377.
—, leaf curl of, in India, in relation to cotton leaf curl, 573, 781.
—, *Pythium aphanidermatum* on, in Malaya, 354.
— *elegans*, *Bacillus aroideae* on, in Japan, serological study on, 700.
— —, *Bacterium solanacearum* on, in Porto Rico, 29.
— —, (?) tobacco 'kroepoek' (leaf curl) affecting, in Java, 479.
— —, tomato spotted wilt affecting, in Australia, 549.
Zizyphus jujuba, (?) *Glomerella cingulata* on, in U.S.A., 313.
Zygorrhynchus, decomposition of hemicelluloses by, 263.

PRINTED IN
GREAT BRITAIN
AT THE
UNIVERSITY PRESS
OXFORD
BY
JOHN JOHNSON
PRINTER
TO THE
UNIVERSITY